

Montana

Water Supply Outlook Report

February 1st, 2019



(Photo: Eric Larson)

Hoodoo Basin SNOTEL, January 31st, 2019. Ever wonder why your favorite SNOTEL site isn't reporting accurate snow depth? Well, this could be why. Heavy snowfall in late December coated all the towers and bent the antenna at the Hoodoo Basin SNOTEL site, disabling communications after December 28th. The Snow Survey staff was unable to visit the site during the lapse in appropriations but made the trip to repair the site in time for the February 1st report. The Montana Snow Survey Staff does it's best to identify issues by viewing and editing the data from SNOTEL sites daily, and schedules repair trips as soon as possible. We heard from many interested parties regarding this SNOTEL site being down and made it a top priority to get it back up and running.

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Montana Water Supply Outlook Report as of February 1st, 2019

How Forecasts Are Made

Most of the annual streamflow in the Western United States originates as snowfall that has accumulated high in the mountains during winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Predictions are based on careful measurements of snow water equivalent at selected index points. Precipitation, temperature, soil moisture and antecedent streamflow data are combined with snowpack data to prepare runoff forecasts. Streamflow forecasts are coordinated by Natural Resources Conservation Service and National Weather Service hydrologists. This report presents a comprehensive picture of water supply conditions for areas dependent upon surface runoff. It includes selected streamflow forecasts, summarized snowpack and precipitation data, reservoir storage data, and narratives describing current conditions.

Snowpack data are obtained by using a combination of manual and automated SNOTEL measurement methods. Manual readings of snow depth and water equivalent are taken at locations called snow courses on a monthly or semi-monthly schedule during the winter. In addition, snow water equivalent, precipitation and temperature are monitored on a daily basis and transmitted via meteor burst telemetry to central data collection facilities. Both monthly and daily data are used to project snowmelt runoff.

Forecast uncertainty originates from two sources: (1) uncertainty of future hydrologic and climatic conditions, and (2) error in the forecasting procedure. To express the uncertainty in the most probable forecast, four additional forecasts are provided. The actual streamflow can be expected to exceed the most probable forecast 50% of the time. Similarly, the actual streamflow volume can be expected to exceed the 90% forecast volume 90% of the time. The same is true for the 70%, 30%, and 10% forecasts. Generally, the 90% and 70% forecasts reflect drier than normal hydrologic and climatic conditions; the 30% and 10% forecasts reflect wetter than normal conditions. As the forecast season progresses, a greater portion of the future hydrologic and climatic uncertainty will become known and the additional forecasts will move closer to the most probable forecast.

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Snowpack – Overview

Snowpack conditions generally improved across Montana during the month of January, but some regions still remain below, to well below normal for snowpack on Feb 1st. The first two weeks of the month were dominated by high pressure in many basins east of the Divide, while western basins saw snow trickle in during the first week, then transitioned to high pressure during the second week. The bulk of the improvements in snowpack totals were from the storm system that began during the third week of January, where significant snow totals fell in central basins along and east of the Divide and in southwestern and south-central Montana. Snowpack in some of these regions was well below normal (Madison River above Hebgen Lake) and this storm helped to improve conditions from Jan 1st.

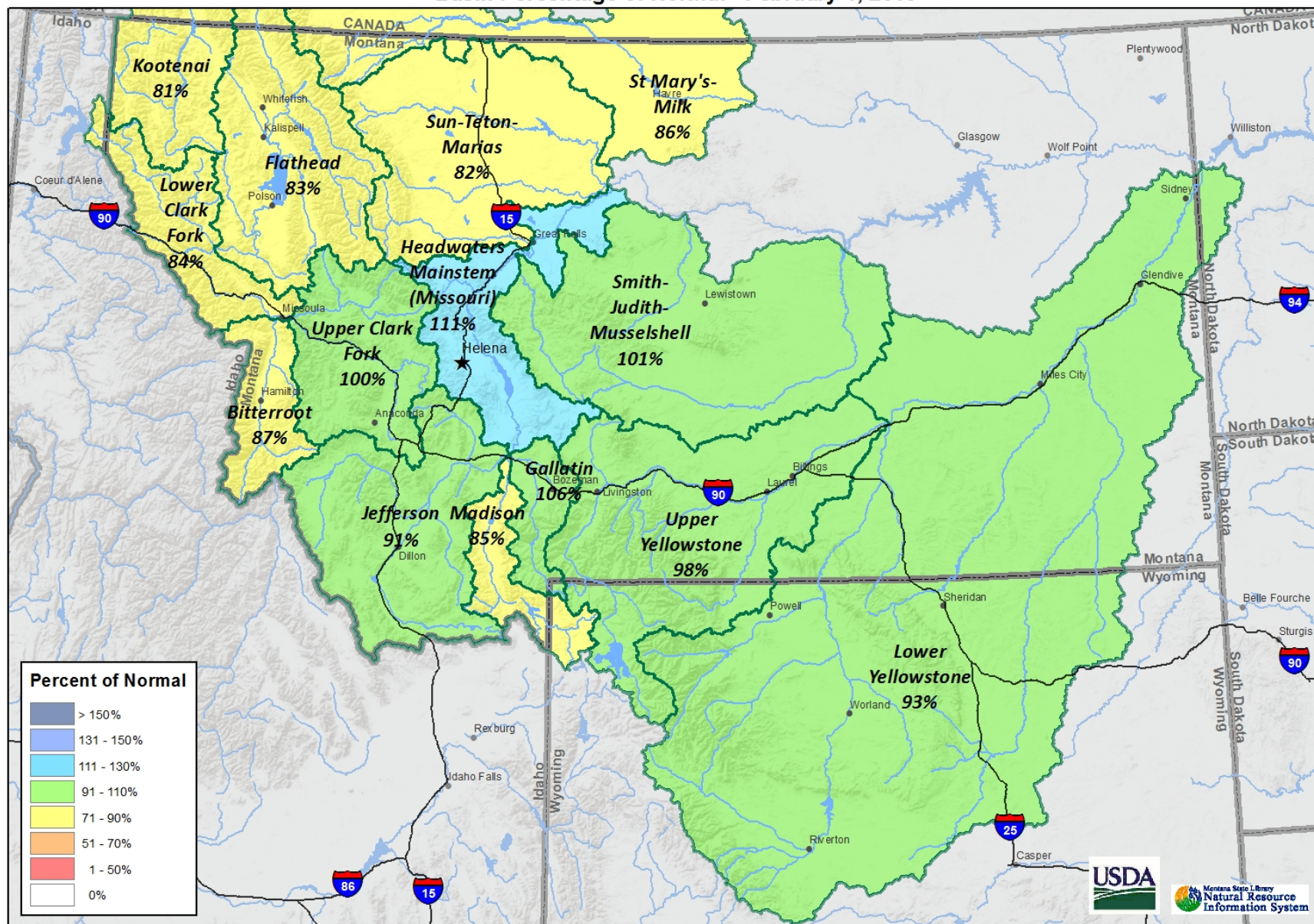
Currently, the Headwaters Mainstem (Missouri) River basin (111%) has the best snowpack in the state on Feb 1, with the Gallatin River basin (106%) is a close second. Basins along the Divide in the central part of the state are near normal for snowpack on this date, while basins in northern and extreme southwestern Montana remain below normal. Improvements were made from Jan 1st in these regions but were not enough to make up for deficits experienced earlier in the winter.

Last month we highlighted the potential impacts of El Nino, and models now indicate that sea surface temperatures will cool over the coming months, meaning this will not be classified a “strong” El Nino winter. What has been anomalous this winter have been our monthly temperatures, which have been above average throughout the winter months. Hopefully the latest storm trajectories will continue to deliver snowfall as we progress towards spring, but above average temperatures can significantly impact spring and summer runoff. The most recent [long-range outlooks issued by the Climate Prediction Center](#) for the February – April time period suggest that this could be the case.

Snow Water Equivalent

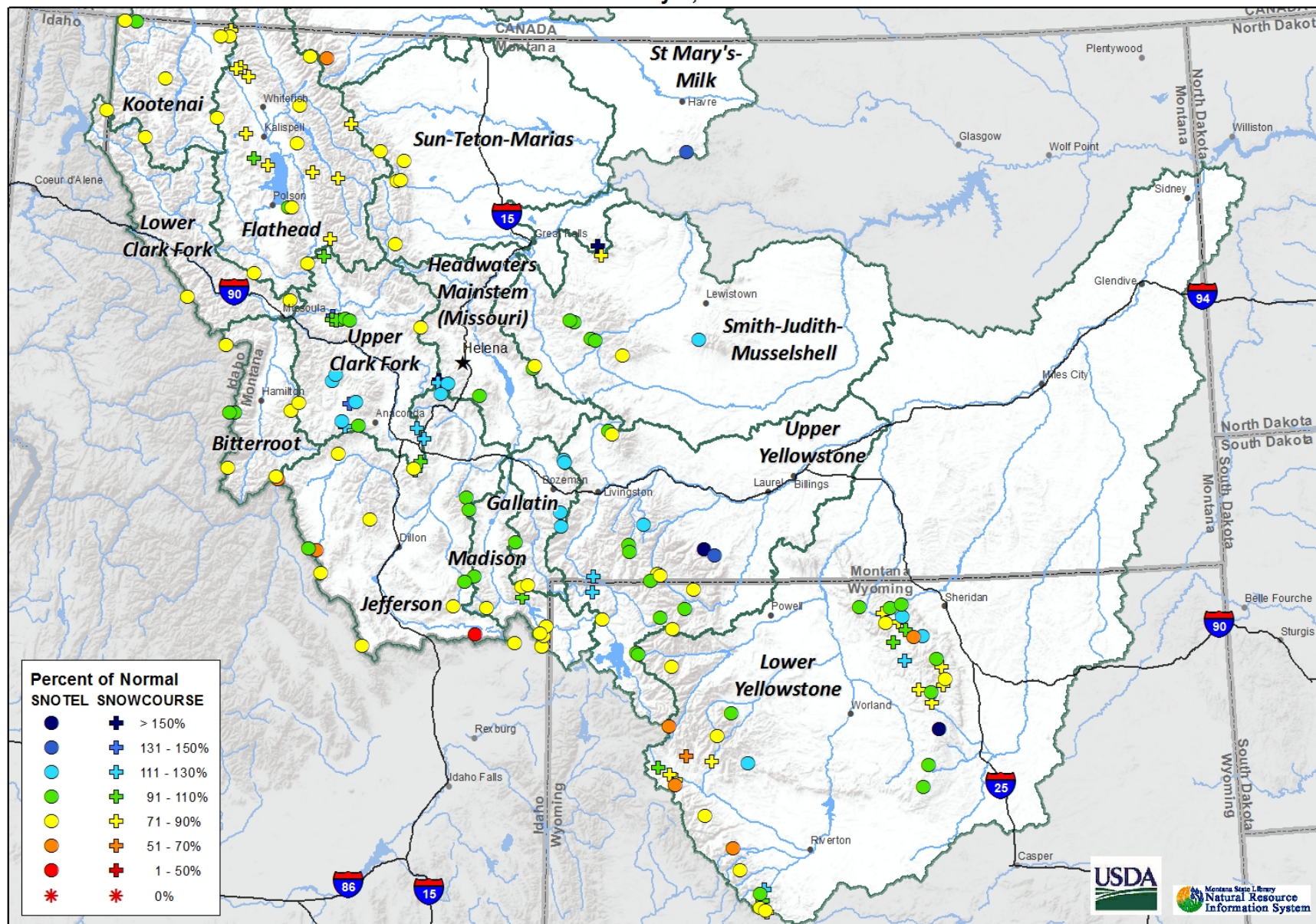
2/1/2019	% Normal	% Last Year
Columbia River Basin	87	72
Kootnenai in Montana	81	72
Flathead in Montana	83	72
Upper Clark Fork	100	71
Bitterroot	87	76
Lower Clark Fork	84	74
Missouri River Basin	95	77
Jefferson	91	72
Madison	85	75
Gallatin	106	80
Headwaters Mainstem	111	75
Smith-Judith-Musselshell	101	82
Sun-Teton-Marias	82	71
St. Mary-Milk	86	85
Yellowstone River Basin	95	73
Upper Yellowstone	98	66
Lower Yellowstone	93	82
West of Divide	87	72
East of Divide	93	74
Montana State-Wide	91	73

Montana Data Collection Office
Current Snow Water Equivalent
Basin Percentage of Normal - February 1, 2019

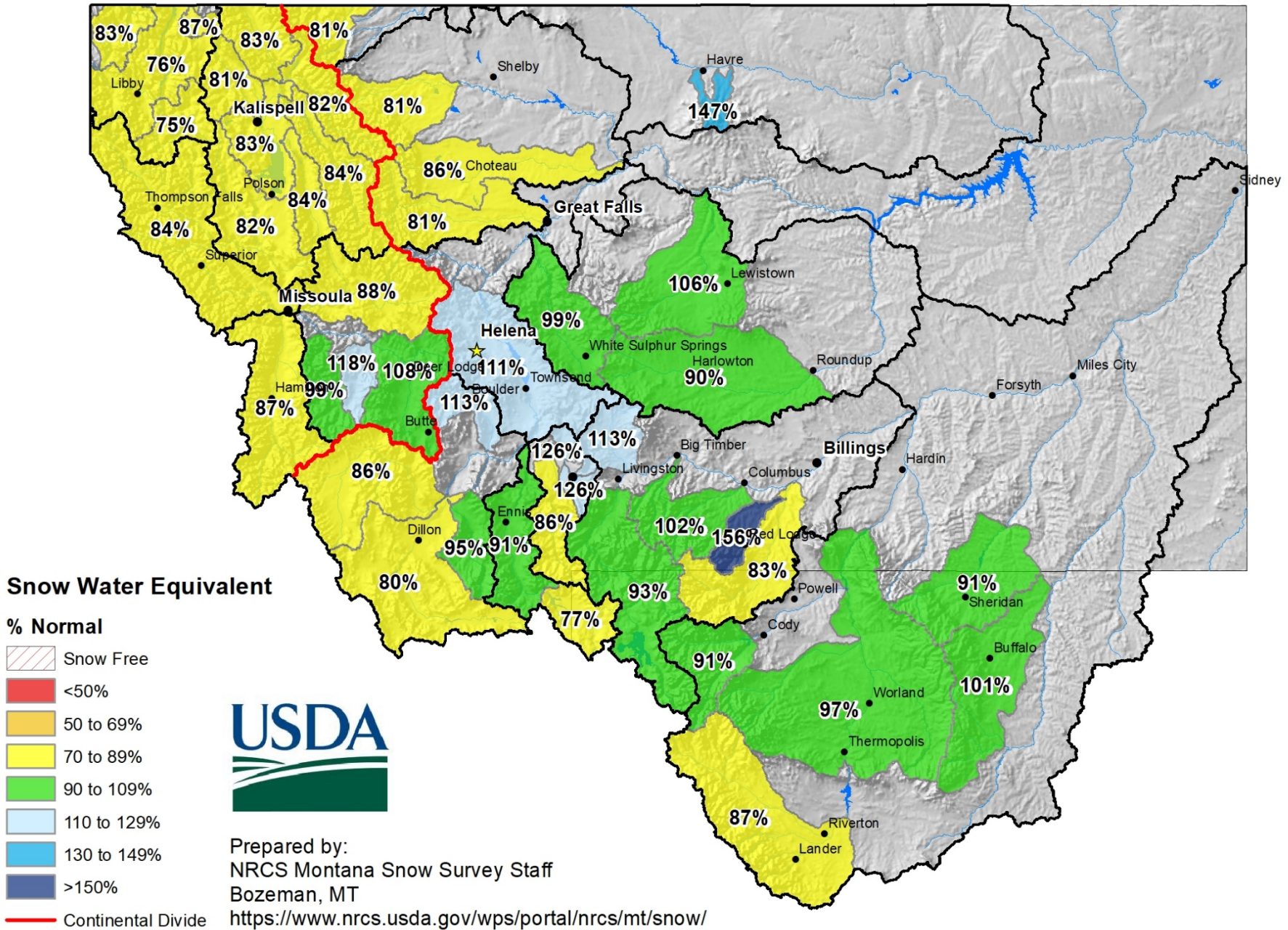


Note: Data includes SNOTEL and Snow course Measurements on February 1, 2019

Montana Data Collection Office
Current Snow Water Equivalent
February 1, 2019



Montana Data Collection Office
Sub-Basin Snow Water Equivalent - February 1st, 2019



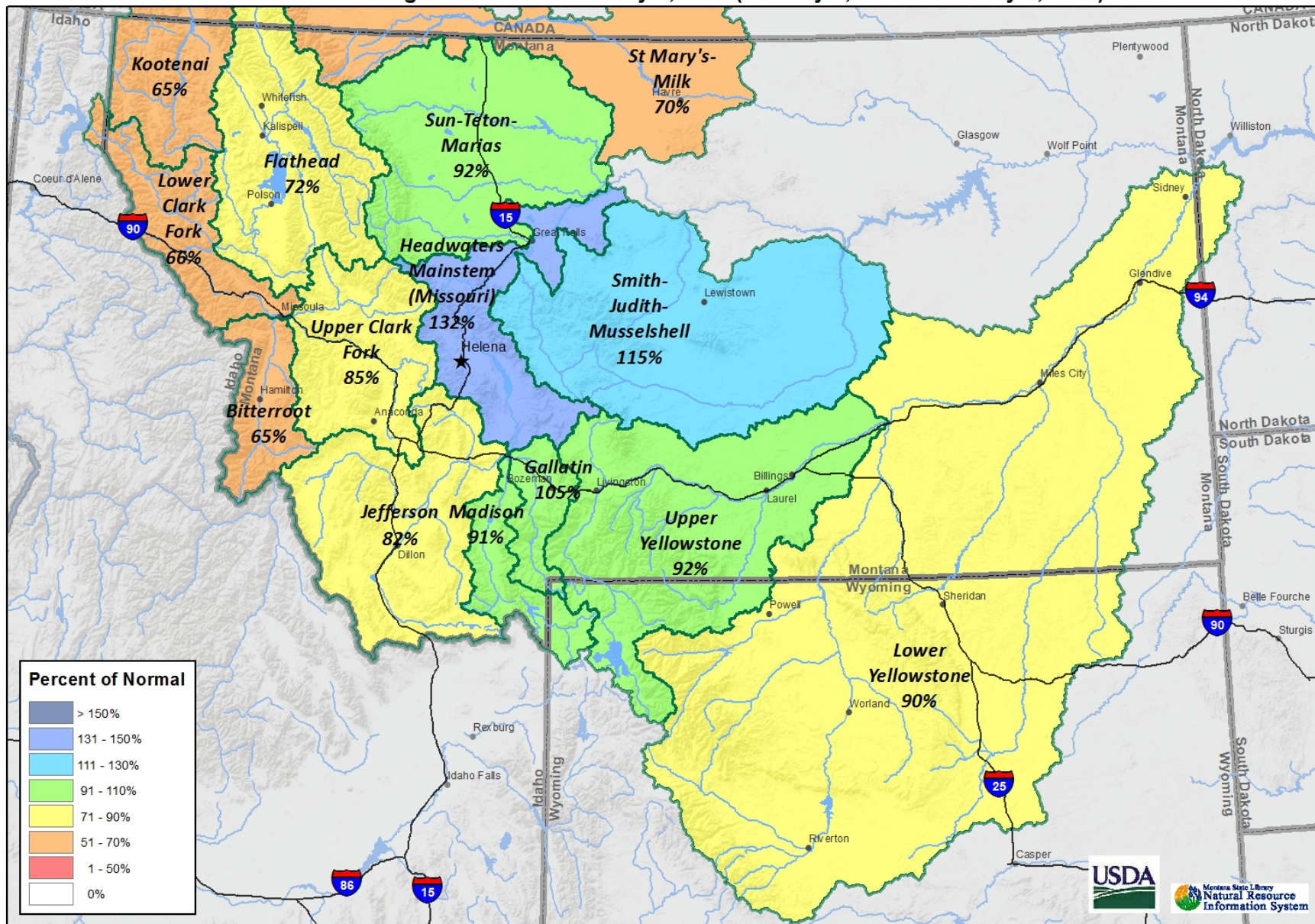
Precipitation - Overview

Looking across the state, it's easy to see where the bulk of the precipitation fell during the month. Valleys of southwest Montana in the Beaverhead River basin are brown and snow free, unlike last year when abundant snow blanketed the mountains and valley. It was this region of southwest Montana that received the lowest precipitation totals for the month of January. Following the [Idaho border north to Canada](#) you can also note a lack of monthly precipitation, though totals were not as low as the southwestern basins. The northwest part of the state has experienced persistently dry summer weather patterns since July of 2015, and drought conditions formed through the summer months. Dry forests lead to large and destructive fires across the regions this summer, and soil moisture values fell to near record low levels at mountain locations as summer progressed. [Areas of Flathead and Lincoln county remain in the D1 drought category](#) and will be monitored through the winter and spring with regards to peak snowpack accumulation and early summer precipitation.

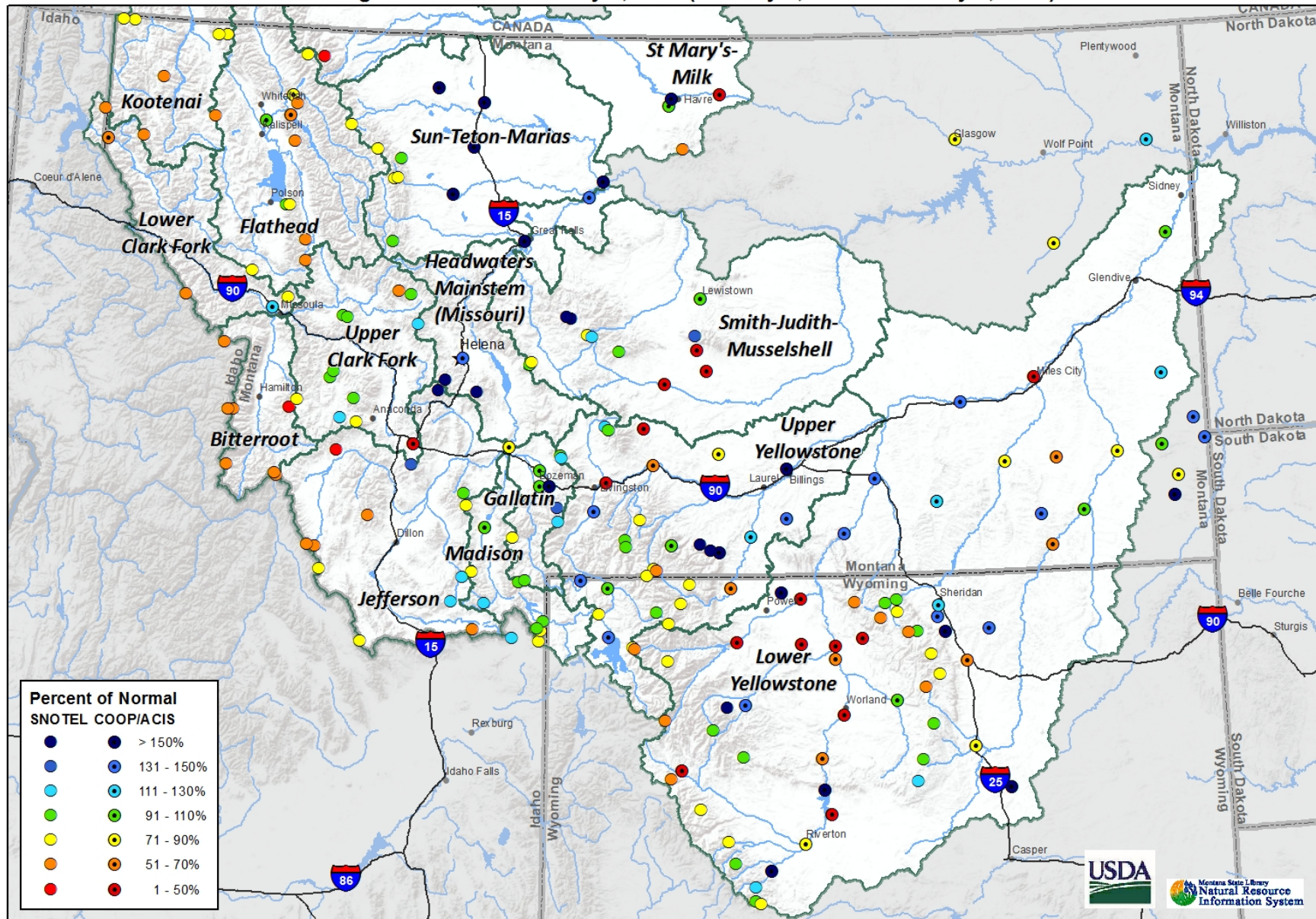
Precipitation

2/1/2019	Monthly % Avg	Water Year % Avg	WY % Last Year
Columbia River Basin	72	88	76
Kootenai in Montana	65	77	69
Flathead in Montana	72	88	72
Upper Clark Fork	85	95	80
Bitterroot	65	95	89
Lower Clark Fork	66	88	78
Missouri River Basin	97	96	88
Jefferson	82	91	92
Madison	91	86	83
Gallatin	105	114	95
Headwaters Mainstem	132	103	82
Smith-Judith-Musselshell	115	100	92
Sun-Teton-Marias	92	89	72
St. Mary-Milk	70	87	73
Yellowstone River Basin	92	96	83
Upper Yellowstone	92	100	75
Lower Yellowstone	90	93	94
West of Divide	72	88	76
East of Divide	92	94	84
Montana State-Wide	83	93	80

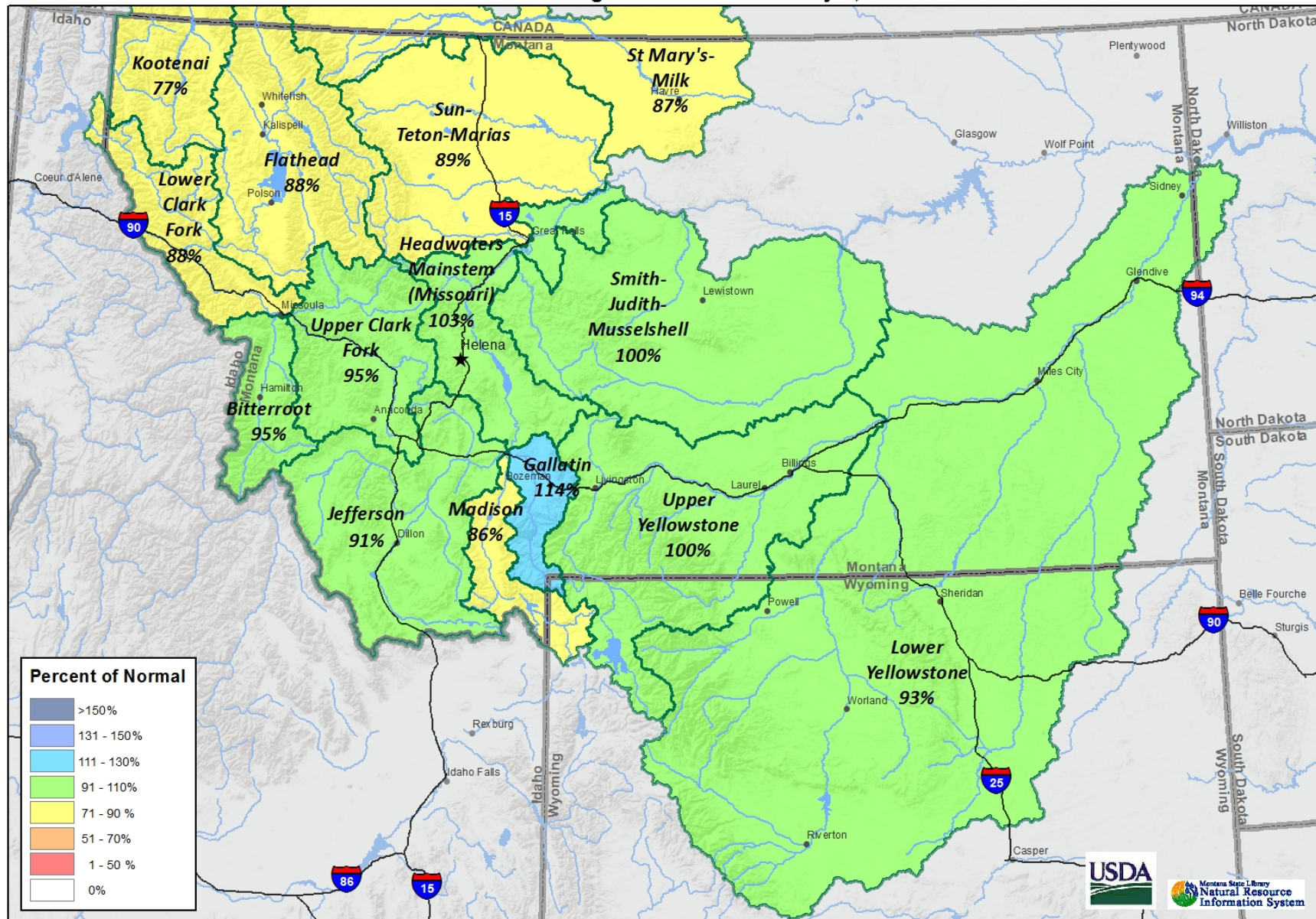
Montana Data Collection Office
 Monthly Precipitation
 Basin Percentage of Normal - February 1, 2019 (January 1, 2019 - February 1, 2019)



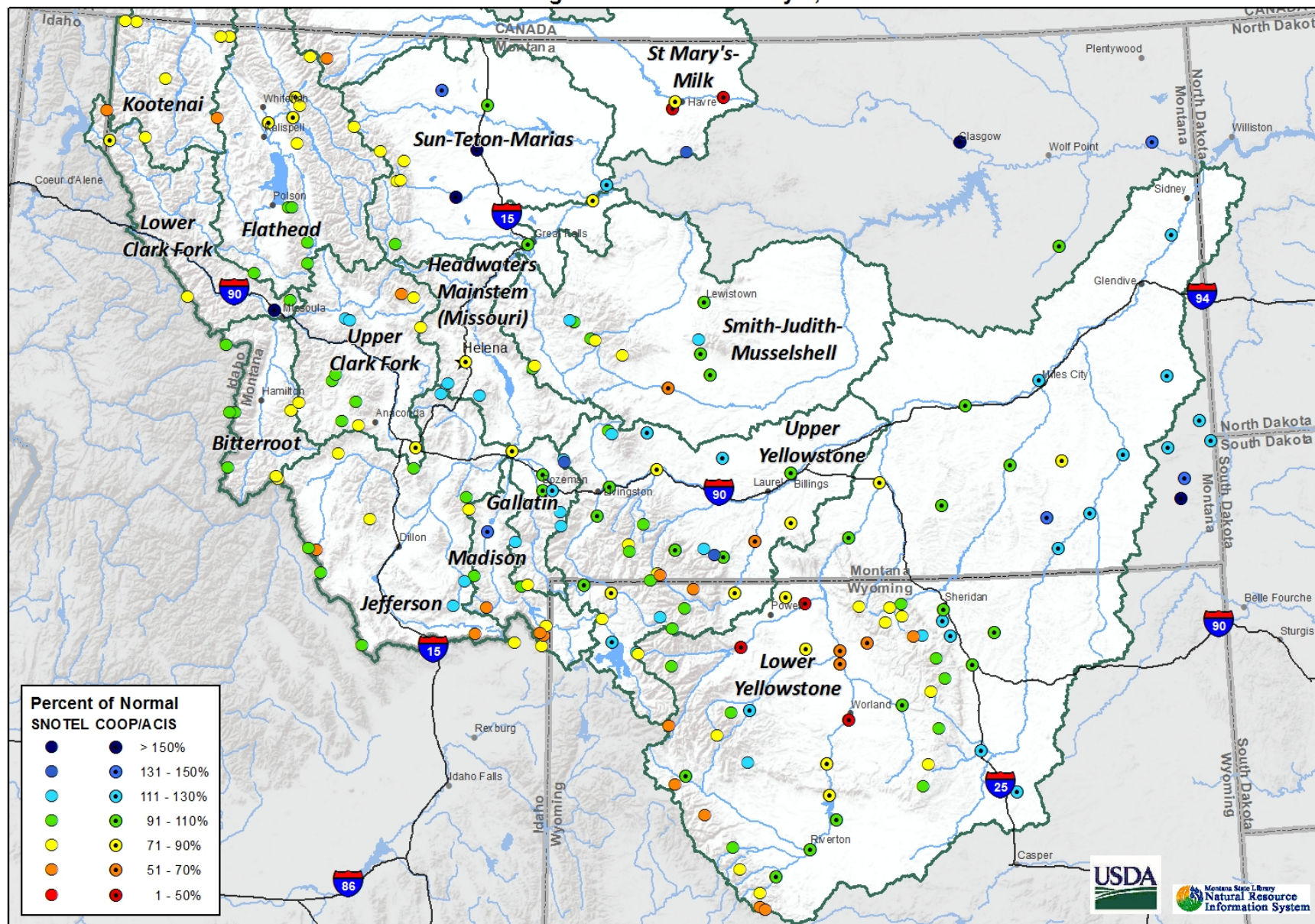
Montana Data Collection Office
 Monthly Precipitation
 Percentage of Normal - February 1, 2019 (January 1, 2019 - February 1, 2019)



Montana Data Collection Office
Water Year to Date Precipitation
Basin Percentage of Normal - February 1, 2019



Montana Data Collection Office
Water Year to Date Precipitation
Percentage of Normal - February 1, 2019



Reservoirs - Overview

As of January 1st, 2019, [Montana was storing the most water in reservoirs across the western US](#). That's great news. Reservoir storage typically doesn't change much through the winter, as streamflows are minimal through the winter, and operators are holding water as carryover from the prior year. This month, reservoir storage is similar to last month, with most reservoirs across the state at average levels or above on February 1st. Carryover storage is the highest in the Musselshell River basin where all reservoirs are well above average for this date. A few reservoirs along the Rocky Mountain Front continue to have reservoir storage which is below average on Feb 1st. Pishkun Reservoir is undergoing work at this time, hence the low levels for this date.

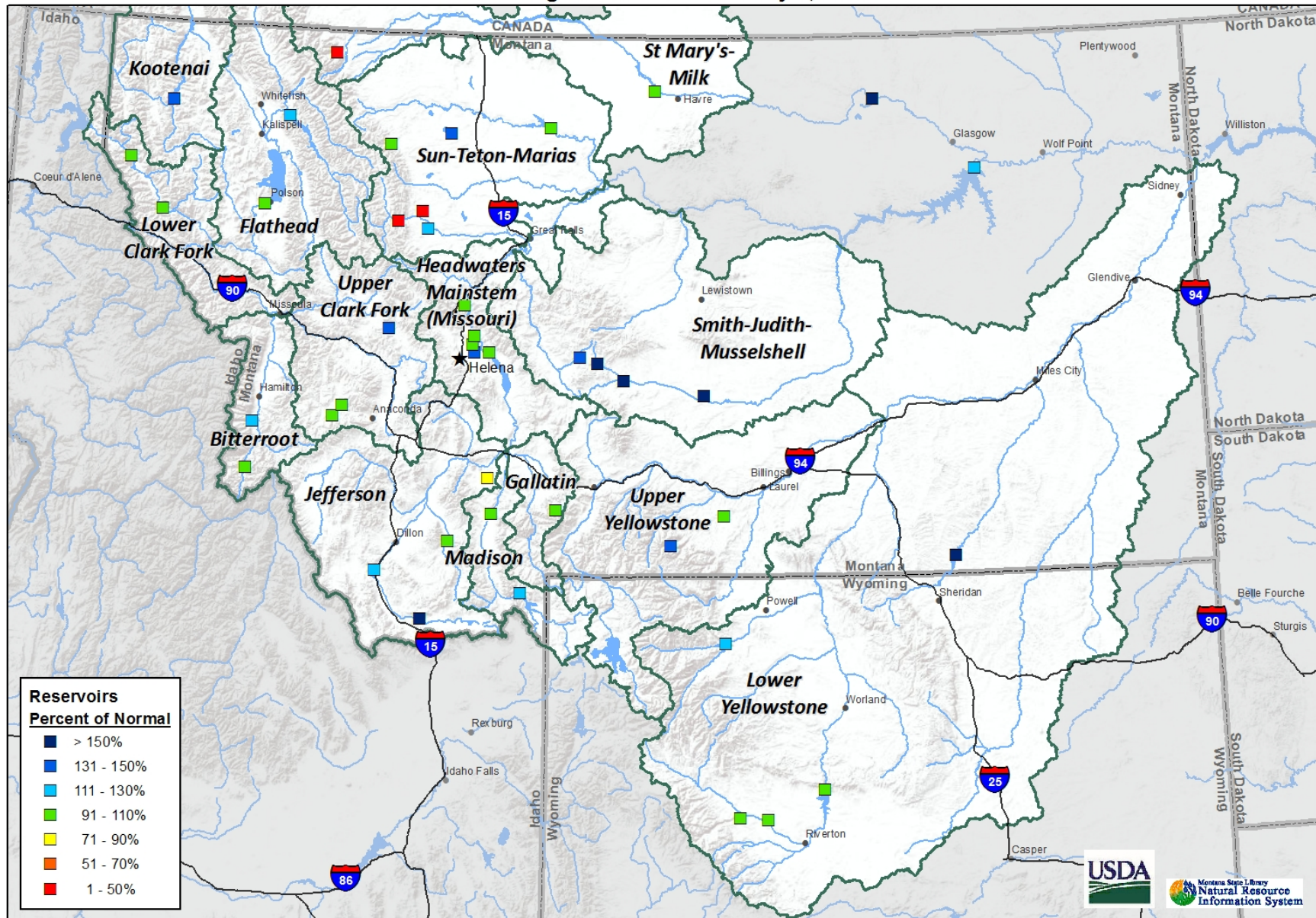
Aside from large power project reservoirs, most smaller irrigator-controlled reservoirs are typically filled from 40% to 80% of capacity on Feb 1st, meaning spring and summer runoff are still critical to summer operations when demand is high. So, while above average carryover storage certainly helps to insulate water users in the summer months, it is rarely enough if dry weather patterns take hold during the spring and early summer months when precipitation is critical east of the Divide. There's no indication yet that operators will have trouble filling most reservoirs given current snowpack conditions, but it is something to keep in mind as spring and summer approach should conditions take a turn for the worse.

Reservoir Storage

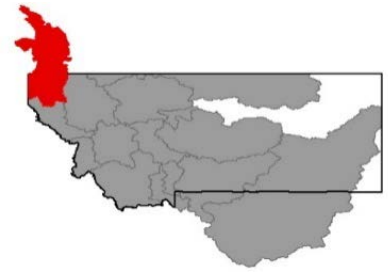
2/1/2019	% Average	% Capacity	% Last Year
Columbia River Basin	121	69	104
Kootnenai in Montana	134	67	112
Flathead in Montana	113	72	99
Upper Clark Fork	107	73	102
Bitterroot	119	30	87
Lower Clark Fork	97	91	101
Missouri River Basin	116	78	102
Jefferson	131	60	102
Madison	112	82	98
Gallatin	101	52	121
Headwaters Mainstem	119	81	102
Smith-Judith-Musselshell	164	89	121
Sun-Teton-Marias	105	54	105
St. Mary-Milk	99	39	105
Yellowstone River Basin	103	61	95
Upper Yellowstone	116	54	90
Lower Yellowstone	103	61	96

West of Divide	121	69	104
East of Divide	115	77	101
Montana State-Wide	117	75	103

Montana Data Collection Office
Reservoir Levels
Percentage of Normal - February 1, 2019



Kootenai River Basin



The Kootenai, which runs from the headwaters in Canada near Banff National Park south into the U.S., has gotten off to a slow start snowpack-wise this year. [Canadian snowpack data](#) from automated stations indicates that snowpack is below normal at their automated weather stations, much like the SNOTEL stations located south of the border in Montana. Snowfall across the basin for the month of January was 63% to 90% of normal and fell on a snowpack that was already below normal on Jan 1st. It wasn't that it didn't snow, in some locations like the high elevation [Stahl Peak SNOTEL](#) outside Eureka, over 5" of Snow Water Equivalent (SWE) was added to the snowpack, but this site typically receives around 7" of SWE for the month of January. At almost all sites in the area the trend was clear, early snowfall in January gave way to a lackluster latter half of the month, and snowpack totals fell as a result. Only one site, Garver Creek SNOTEL (90%), saw an increase in percentages from Jan 1st to Feb 1st. February 1st snowpack totals range from 74% to 91% of normal, and basin-wide snowpack is 81% for this date. This is significant for a few reasons: 1. The northwestern basins have been in some level of drought during the summer since 2015 and [continue to be in D1](#) in certain regions due to lack of precipitation and snowpack this year. This means we continue to build upon deficits, which will take more and more precipitation, whether rain or snow, to overcome. 2. The Kootenai river basin typically [receives the bulk of its precipitation](#) (rain and snow) earlier in the snow year than many eastern basins. That means that it becomes harder to make up the snowpack deficit as we progress further towards spring. Summer precipitation is also critical, but it has been below average for the June 1st – August 31st period since 2015. While not impossible to make up these deficits, it would take a major turnaround in weather patterns to make this happen.

Kootenai River Basin Data Summary

Snowpack

	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
<i>KOOTENAY in CANADA</i>	76%	104%
<i>KOOTENAI MAINSTEM</i>	76%	107%
<i>TOBACCO</i>	87%	117%
<i>FISHER</i>	75%	104%
<i>YAAK</i>	83%	122%
<i>KOOTENAI RIVER BASIN in MONTANA</i>	81%	112%
<i>KOOTENAI ab BONNERS FERRY</i>	81%	113%
Basin-Wide Snowpack	81%	112%

Precipitation

	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	65%	77%	111%
Valley Precipitation	%	%	%
Basin-Wide Precipitation	65%	77%	111%

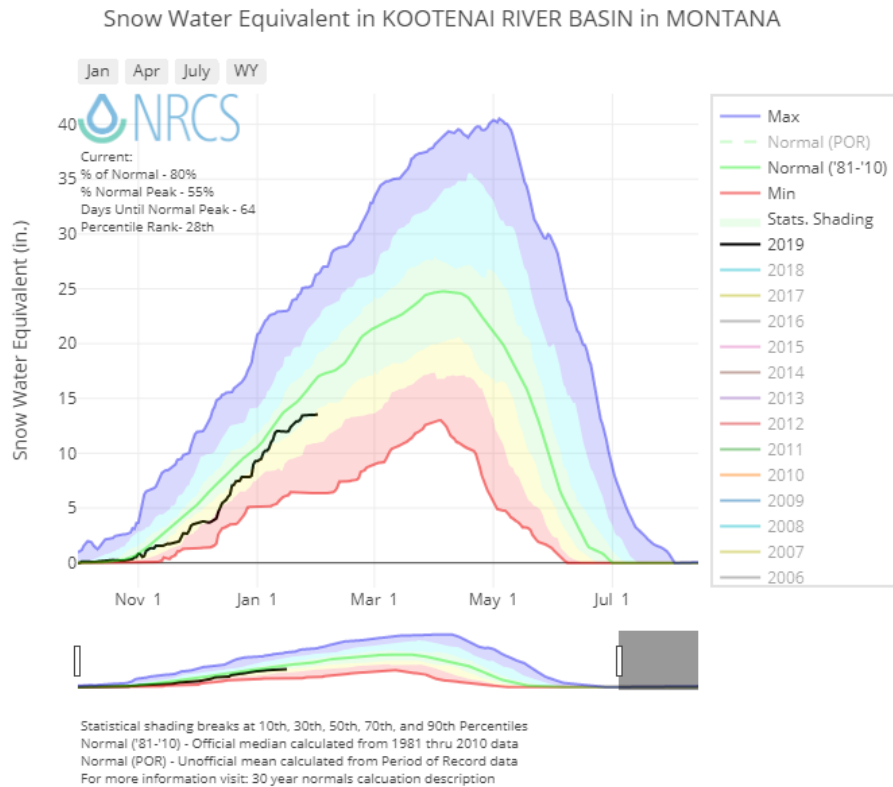
*WYTD Precipitation is October 1st- Current

Reservoir Storage

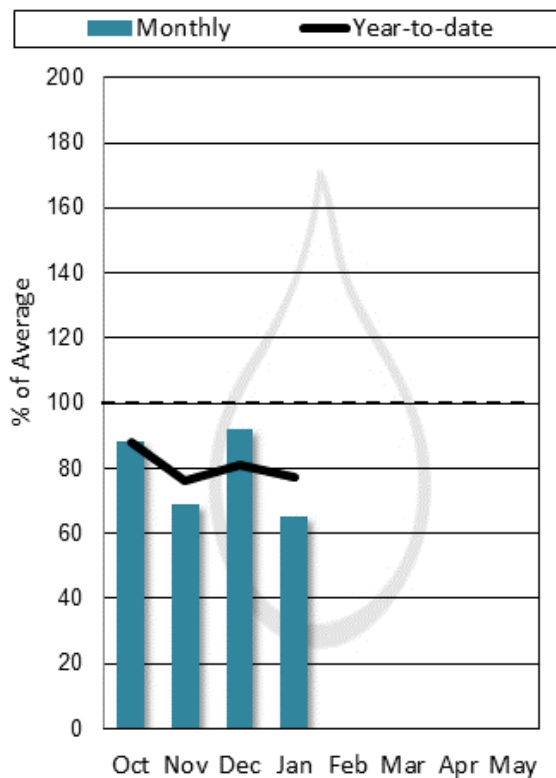
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Reservoir Storage	134%	67%	120%

*See Reservoir Storage Table for storage in individual reservoirs

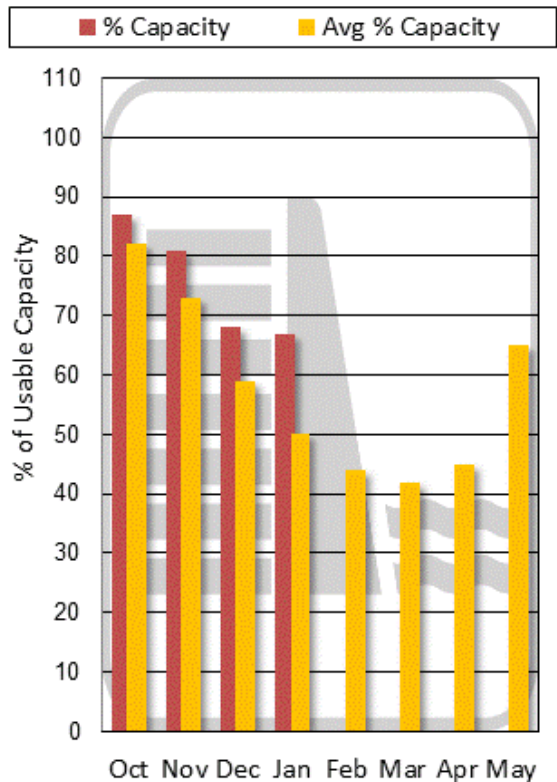
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Mountain and Valley Precipitation

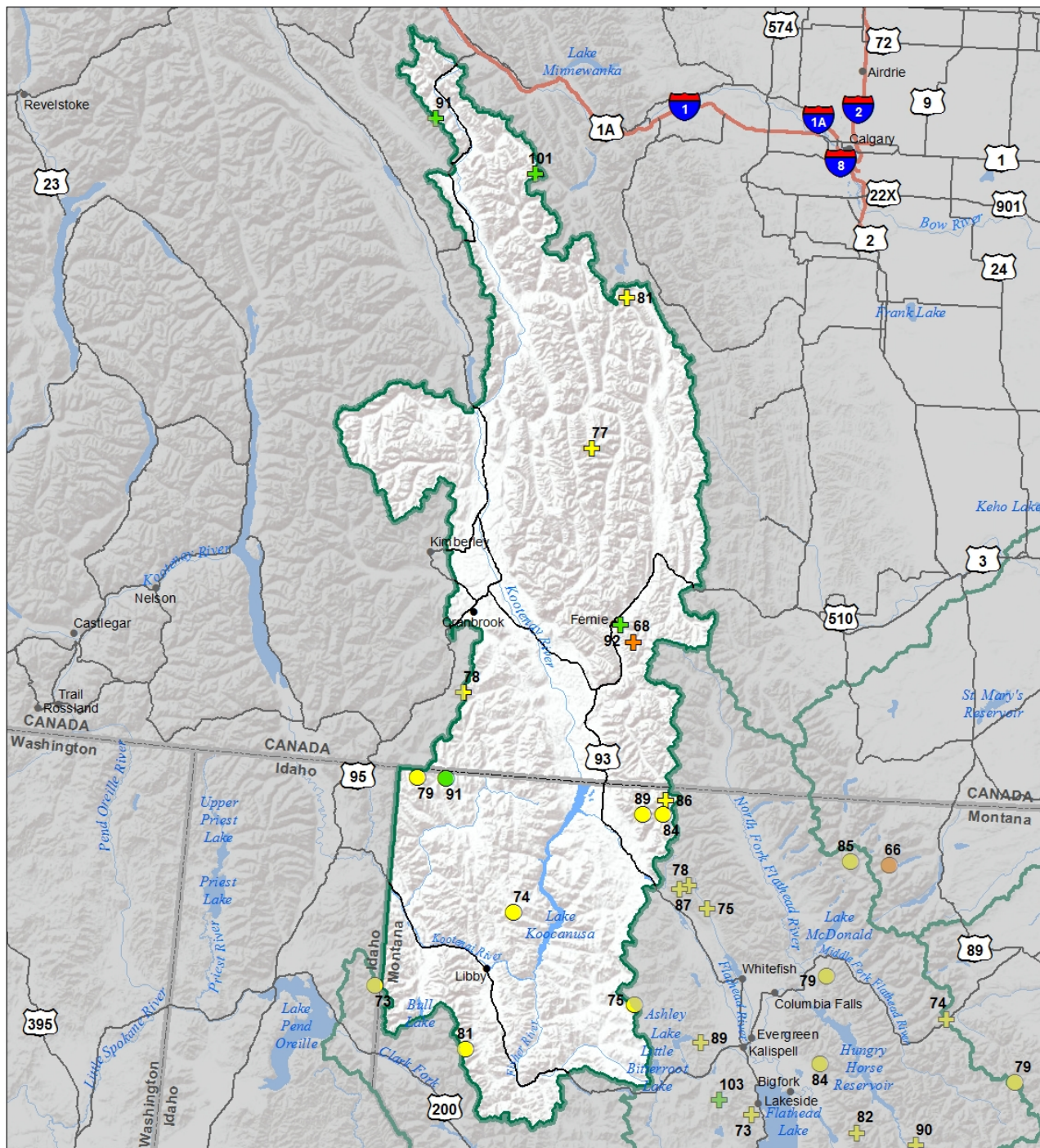


End of Month Reservoir Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

**Kootenai River Basin
Snow Water Equivalent
Percentage of Normal
February 1, 2019**



Snow Water Equivalent Percent of Normal

SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

Snowcourse

+	> 150%	+	71 - 90%
+	131 - 150%	+	51 - 70%
+	111 - 130%	+	1 - 50%
+	91 - 110%	*	0%

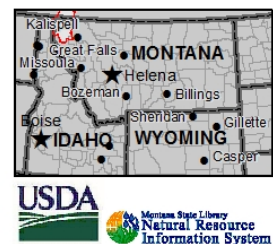
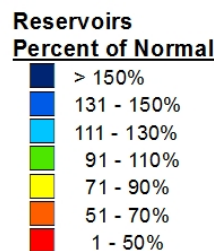
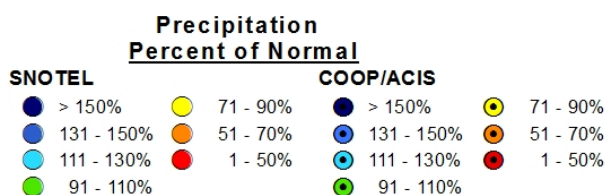
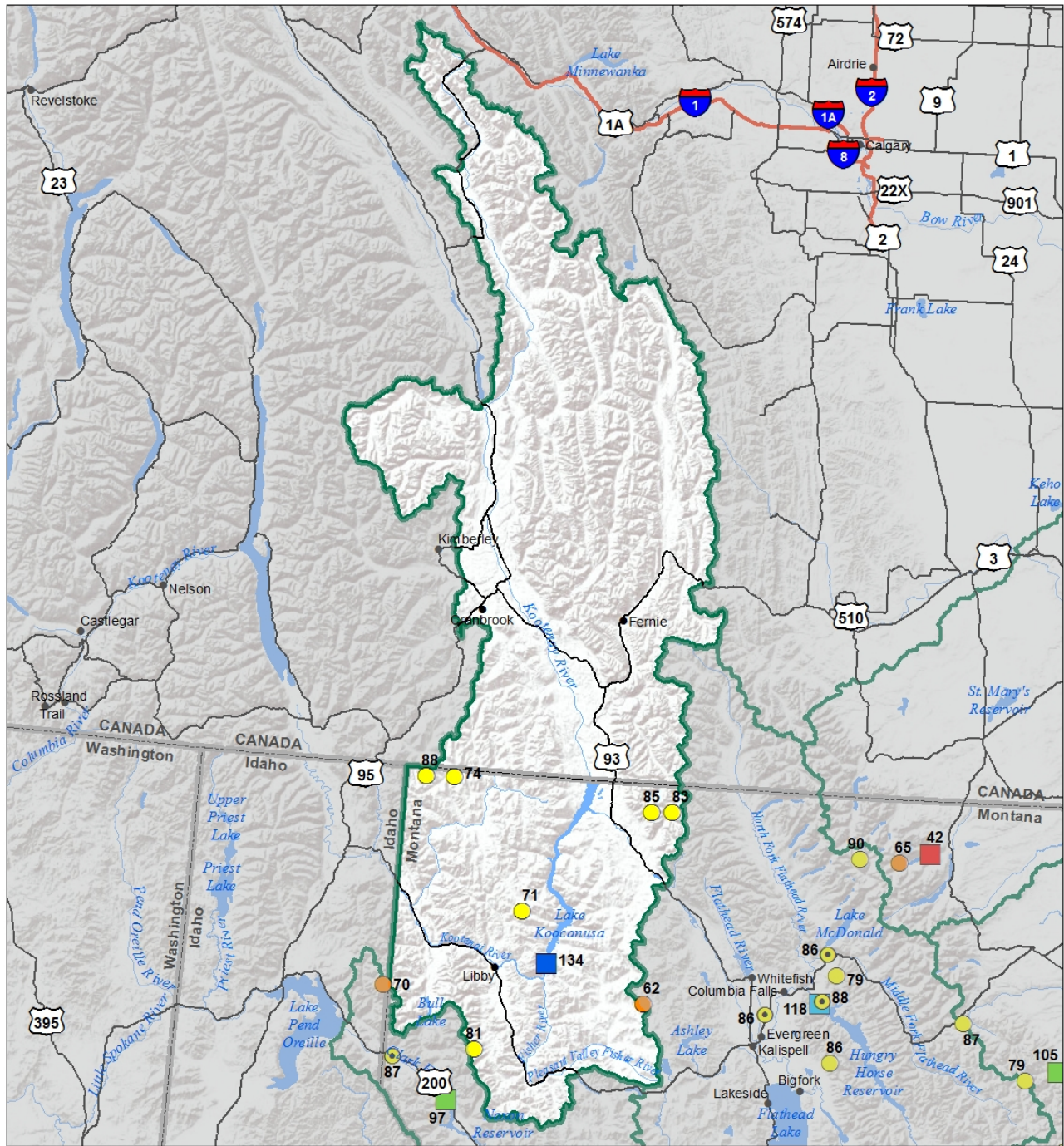


Kootenai River Basin

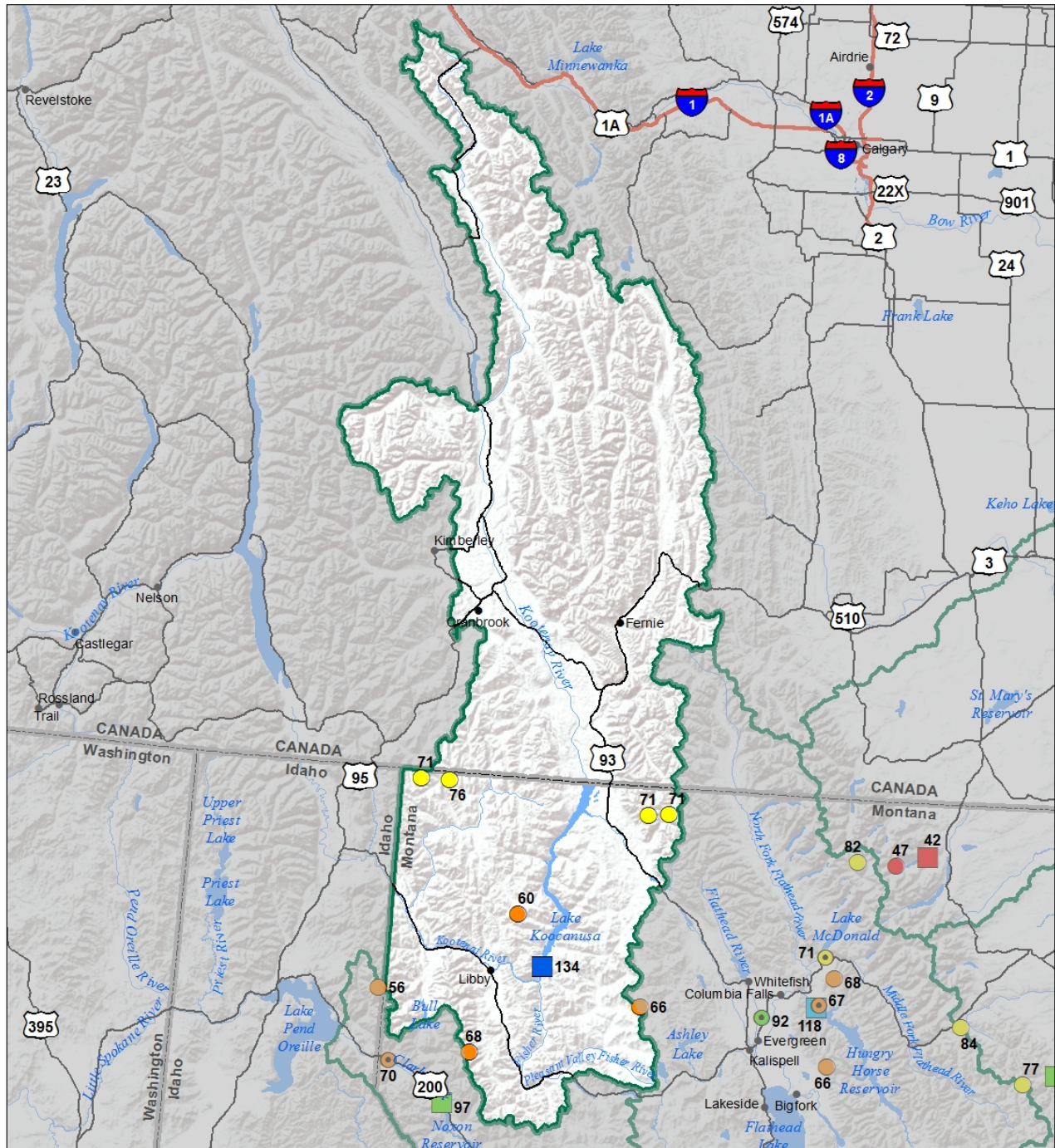
Water Year to Date Precipitation and Reservoir Levels

Percentage of Normal

February 1, 2019



Kootenai River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019 (January 1, 2019 - February 1, 2019)



Precipitation
Percent of Normal

SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

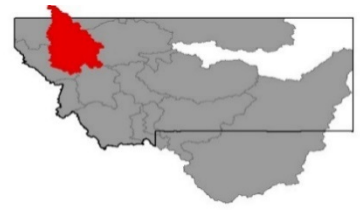
COOP/ACIS

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%





Flathead River Basin

Although storms came through during the month, snow totals for the month of January were below normal and ranged from 62% to 88% of normal in the mountains feeding the Flathead River basin. Only one site received normal or above accumulations for the period, [Bisson Creek SNOTEL](#) reported 104% of normal Snow Water Equivalent (SWE) added to the snowpack. This isn't to say that significant snowfall didn't occur during the month, the high elevation [Noisy Basin SNOTEL site](#), located near Jewel Basin, added 6.4" of SWE to the snowpack since Jan 1st. 3.9" of this snow water was added during a storms that impacted the basin the latter half of the month after January 17th, and helped to make up for the lack of snowfall in early January. But it wasn't enough at the SNOTEL sites in the Flathead to make up for the deficits experienced so far this winter, and all sites remain below normal for snowpack on Feb 1st, and basin-wide totals are 83% of normal. The snowpack still has time to recover from the deficits experienced so far this year, but the time is running out. As we moved towards spring, climatologically, monthly mountain snow accumulation totals typically drop off, as November through January are the "wet" months in the basin. This makes it more difficult to get to where we want to be as we reach peak accumulation of snowpack in April, but not impossible. A major impact to the basin since the summer of 2015 has been the lack of summer precipitation. In each of the summers since, mountain precipitation has been below average to well below average. This has resulted in drought designations by the end of end of September during those years, and it should be noted that snowpack on April 1st was near to above normal entering runoff from 2016-2018. So far this year snowpack conditions haven't entered the dire phase, but conditions should be monitored as we progress through the winter into spring.

Flathead River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
NF FLATHEAD in CANADA	%	%
NF FLATHEAD in MONTANA	83%	107%
MIDDLE FORK FLATHEAD	82%	111%
SOUTH FORK FLATHEAD	84%	141%
STILLWATER-WHITEFISH	81%	97%
SWAN	84%	136%
MISSION VALLEY	85%	132%
LITTLE BITTERROOT-ASHLEY	83%	94%
JOCKO	82%	121%
FLATHEAD in MONTANA	83%	116%
Basin-Wide Snowpack	83%	116%

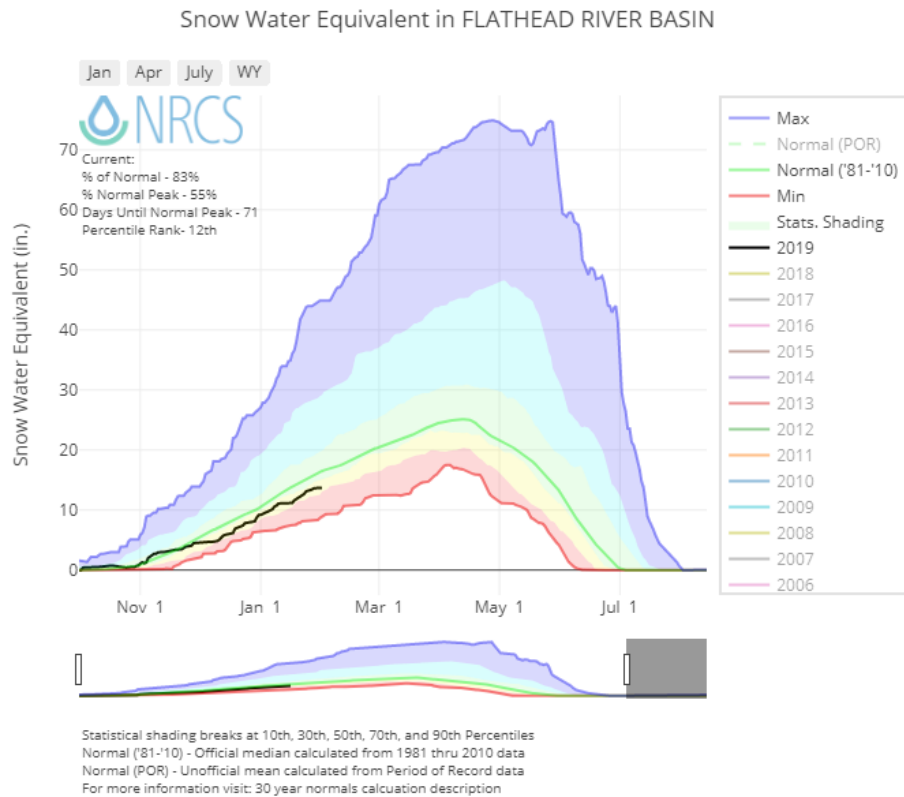
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	72%	88%	122%
Valley Precipitation	92%	86%	123%
Basin-Wide Precipitation	72%	88%	122%

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

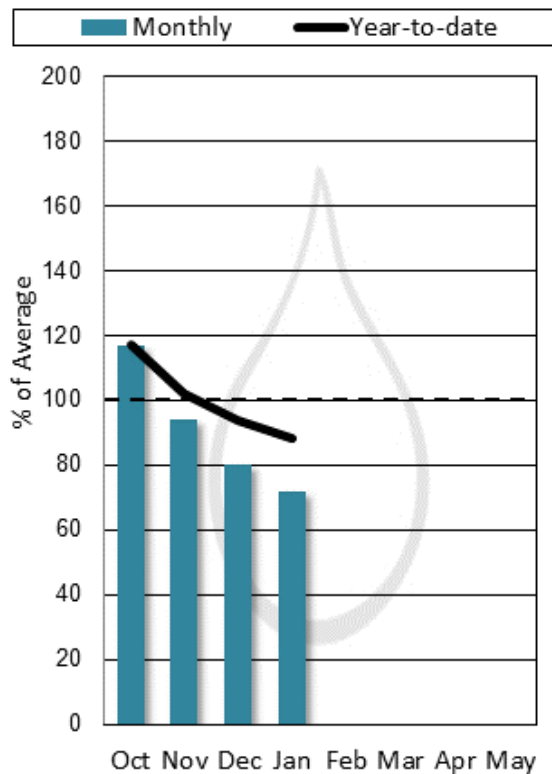
Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Reservoir Storage	113%	72%	114%

*See Reservoir Storage Table for storage in individual reservoirs

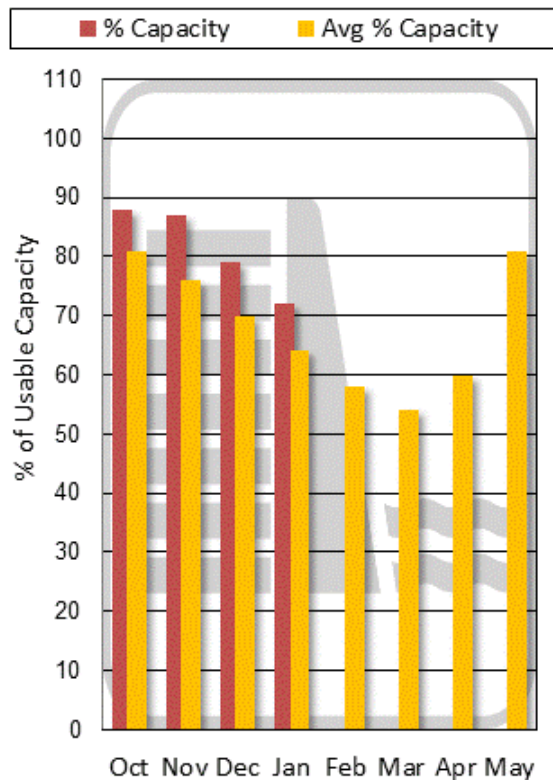
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley Precipitation

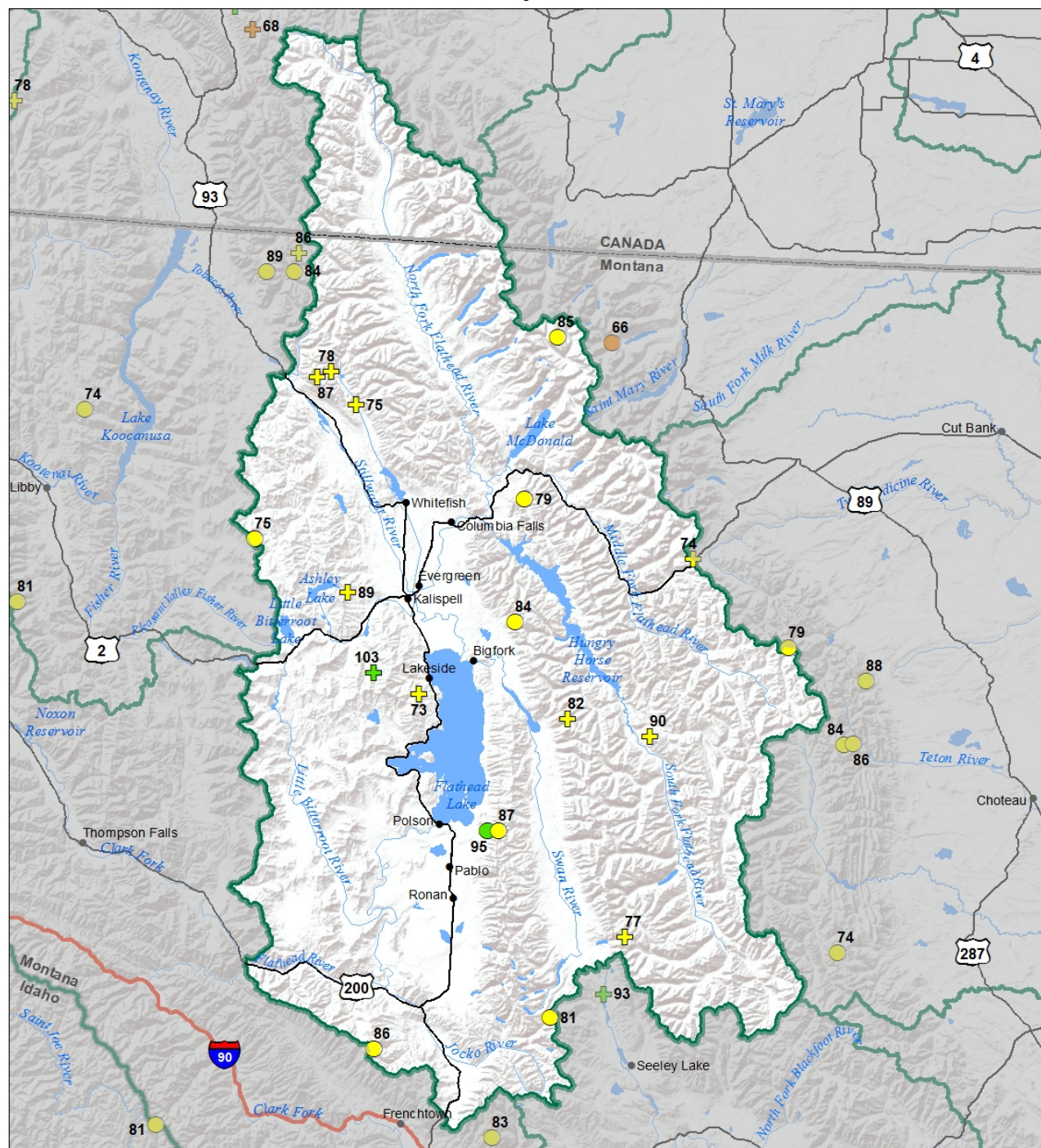


End of Month Reservoir Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

Flathead River Basin Snow Water Equivalent Percentage of Normal February 1, 2019



Snow Water Equivalent Percent of Normal

SNOTEL

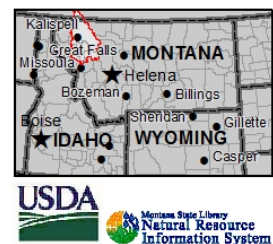
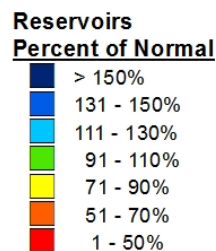
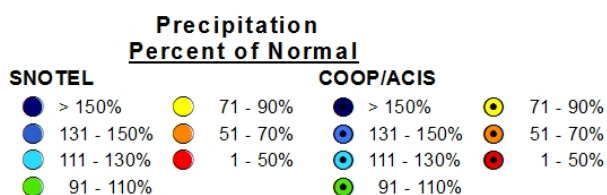
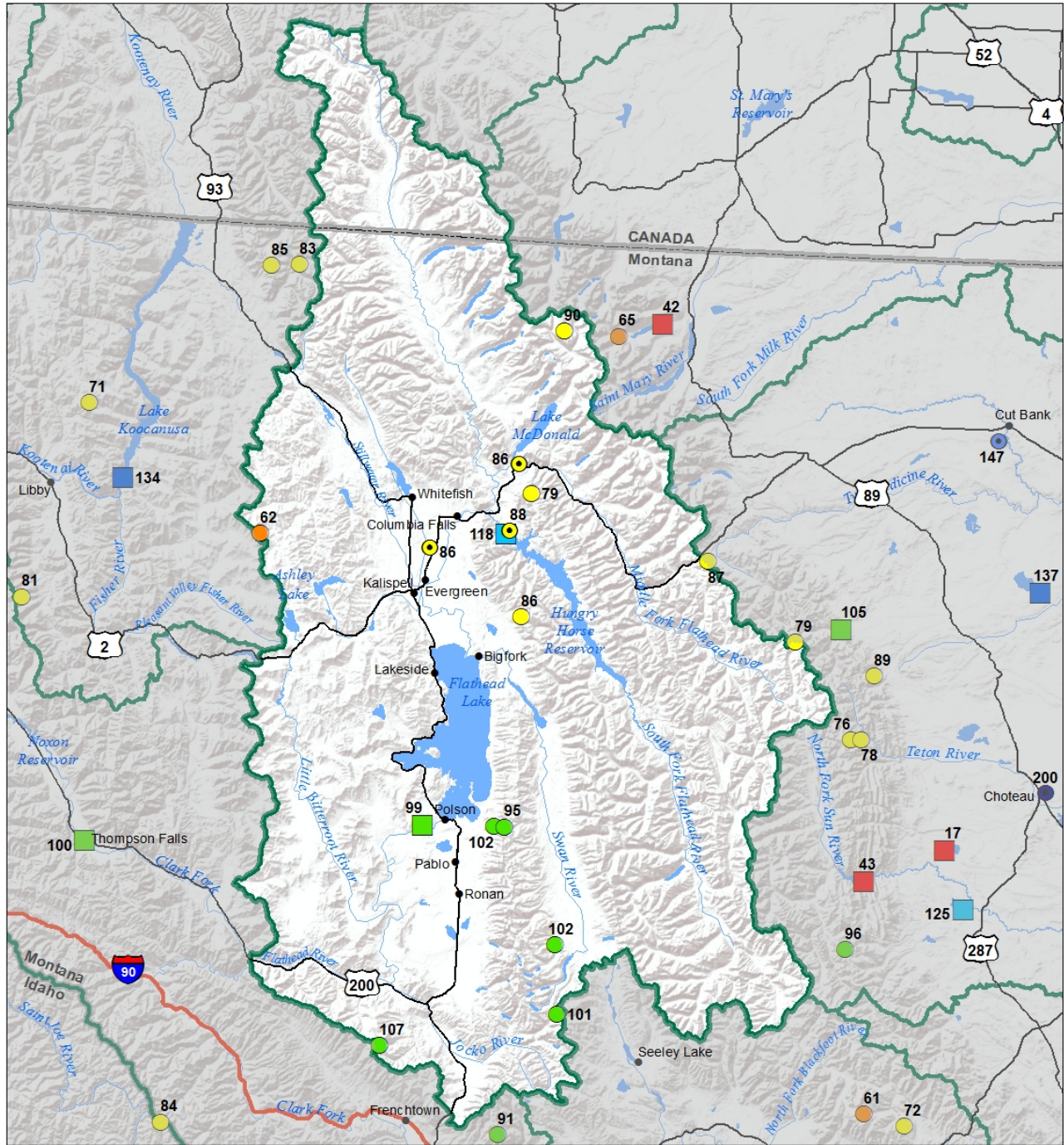
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%

Snowcourse

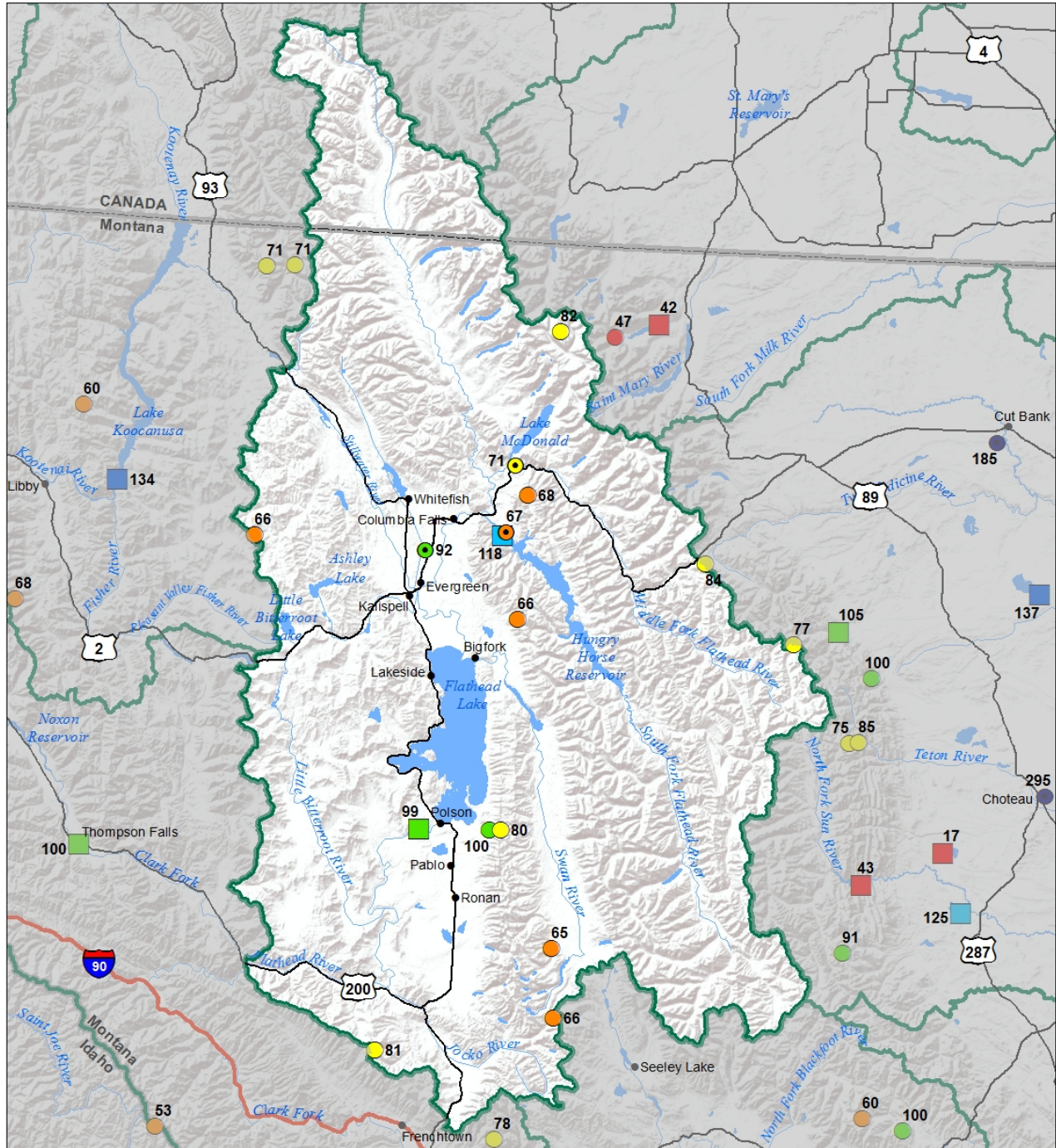
- ✚ > 150%
- ✚ 131 - 150%
- ✚ 111 - 130%
- ✚ 91 - 110%
- ✚ 71 - 90%
- ✚ 51 - 70%
- ✚ 1 - 50%
- ✚ 0%



Flathead River Basin Water Year to Date Precipitation and Reservoir Levels Percentage of Normal February 1, 2019



Flathead River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019 (January 1, 2019 - February 1, 2019)



Precipitation
Percent of Normal

SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

COOP/ACIS

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%



Upper Clark Fork River Basin



There aren't a lot of areas in the state that can boast a "normal" snowpack for Feb 1st, but the Upper Clark Fork River basin is one of the few. Significant early season snowfall from late October into early November boosted snow totals early and has kept many of the snowpack monitoring locations in the southern half of the basin near to slightly above normal for February 1st. January snowfall, in general, was near to above average, largely in part to the storms that came through during the latter half of the month. [Nevada Ridge SNOTEL](#), which was record low on January 1st added 1.9" of Snow Water Equivalent (SWE) to the snowpack from January 17th-28th, bringing it to 86% of normal on Feb 1st. Great news for Nevada Reservoir water users. A few areas received below normal snowfall, the Sapphire Range feeding Rock Creek and the Swan Range recorded low January totals (68% -76%). It is these areas in the Rock Creek and Blackfoot River basins that have below normal snowpack on February 1st. Looking forward, there is still a lot of winter left for things to improve in these regions, and the overall snowpack is right where we expect it to be in most areas on Feb 1st. After typing the word record over and over last year it's nice to use the word normal. For now.

Upper Clark Fork River Basin Data Summary

Snowpack

	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
CLARK FORK ab FLINT CREEK	110%	158%
FLINT CREEK	118%	131%
ROCK CREEK	99%	128%
CLARK FORK ab BLACKFOOT	108%	143%
BLACKFOOT	88%	141%
Basin-Wide Snowpack	100%	141%

Precipitation

	Monthly Percentage of Average	WYTD Percentage of 1981- 2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	86%	95%	119%
Valley Precipitation	30%	75%	88%
Basin-Wide Precipitation	85%	95%	119%

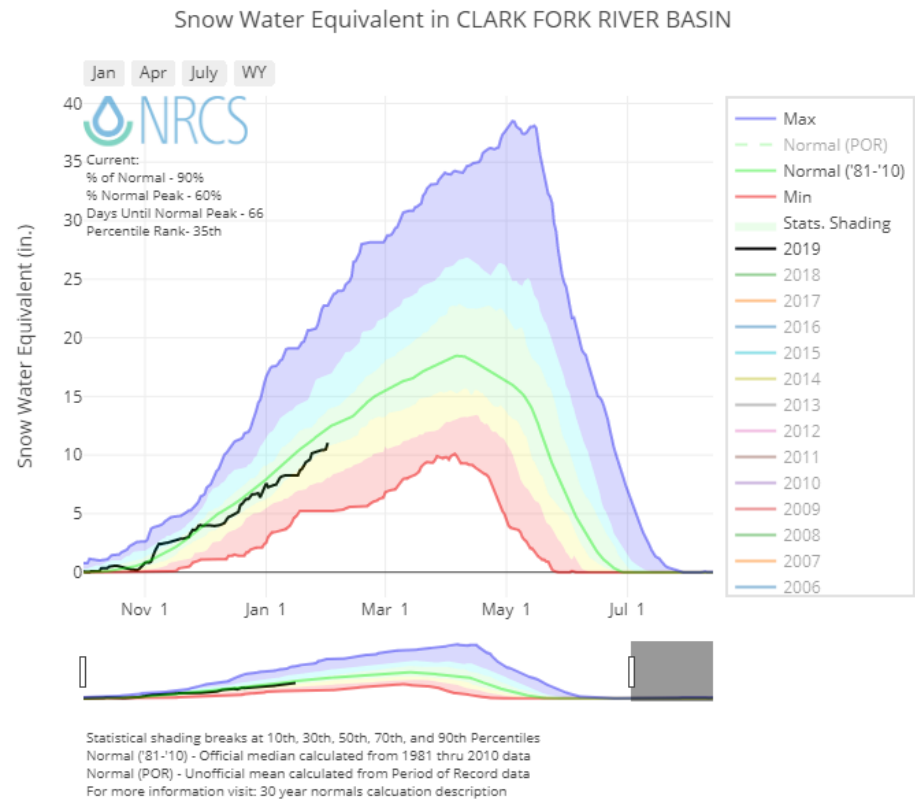
*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

Reservoir Storage

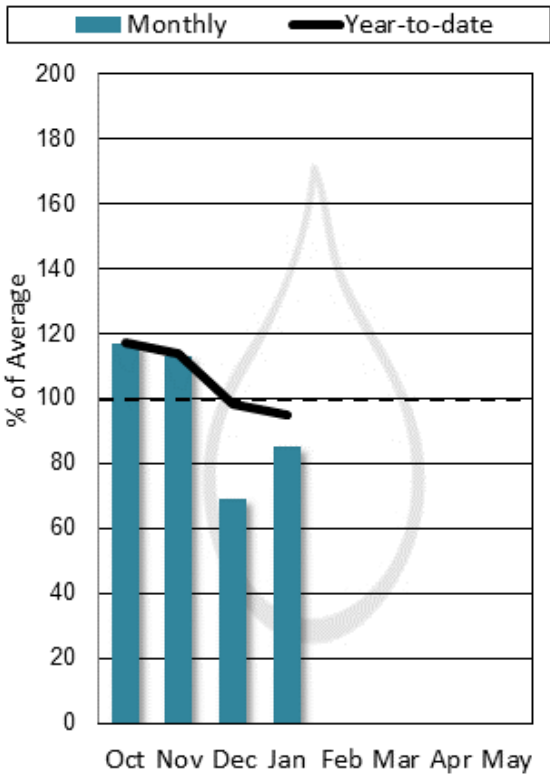
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	107%	73%	105%

*See Reservoir Storage Table for storage in individual reservoirs

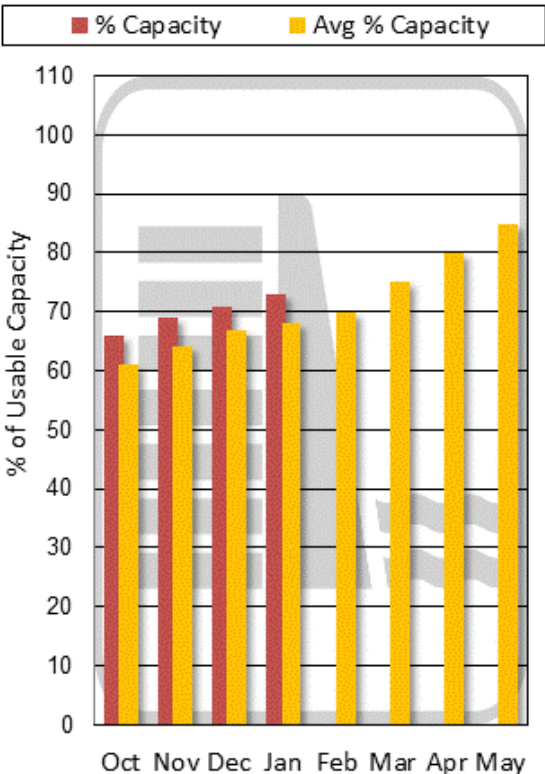
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley
Precipitation

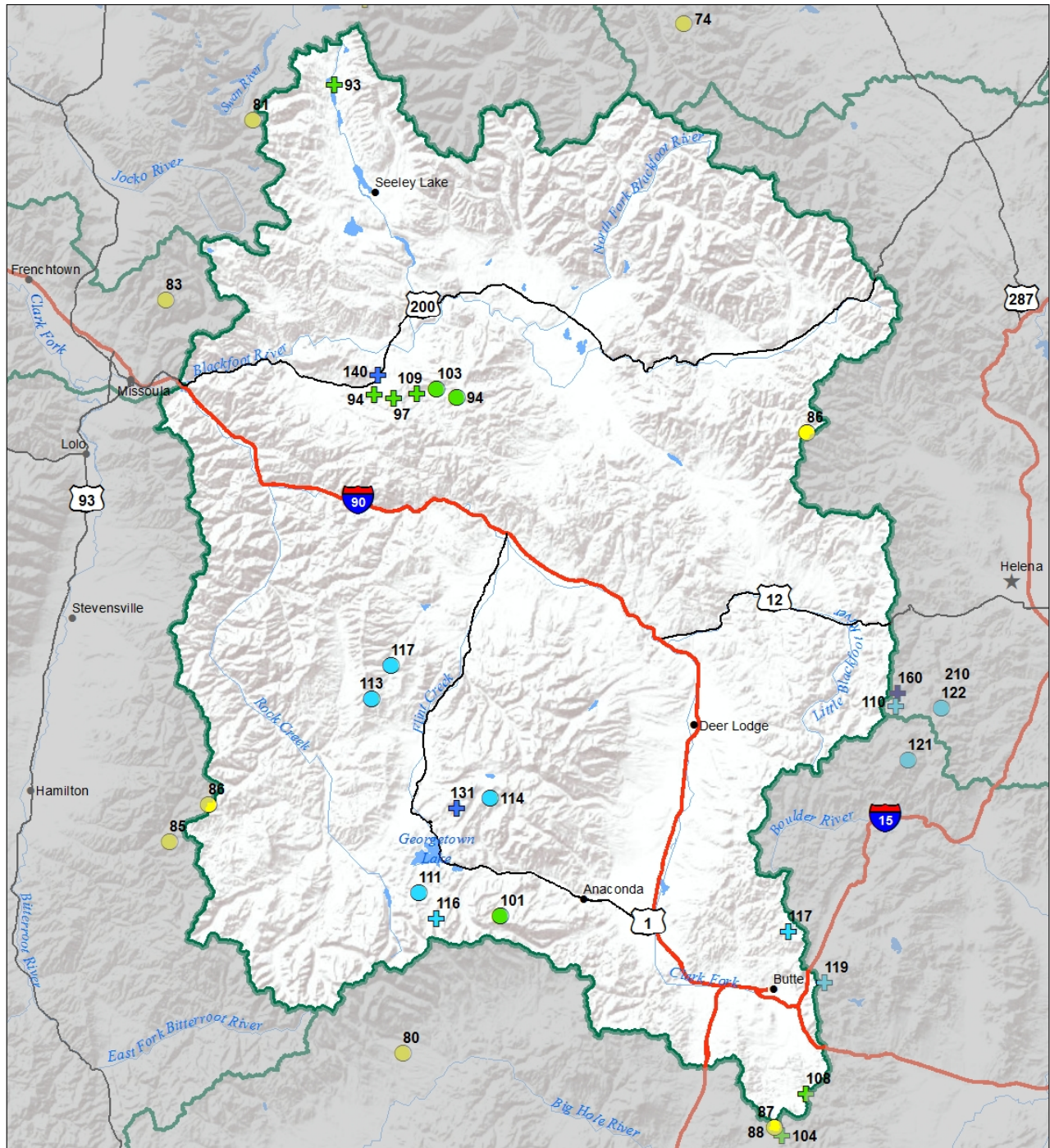


End of Month Reservoir
Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

Upper Clark Fork River Basin
Snow Water Equivalent
Percentage of Normal
February 1, 2019



**Snow Water Equivalent
Percent of Normal**

SNOTEL

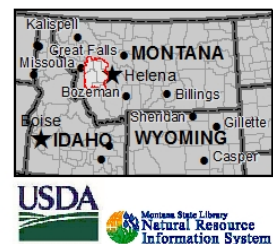
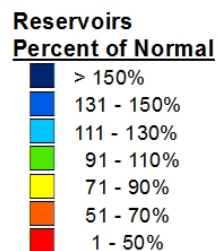
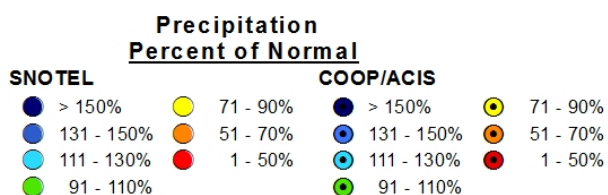
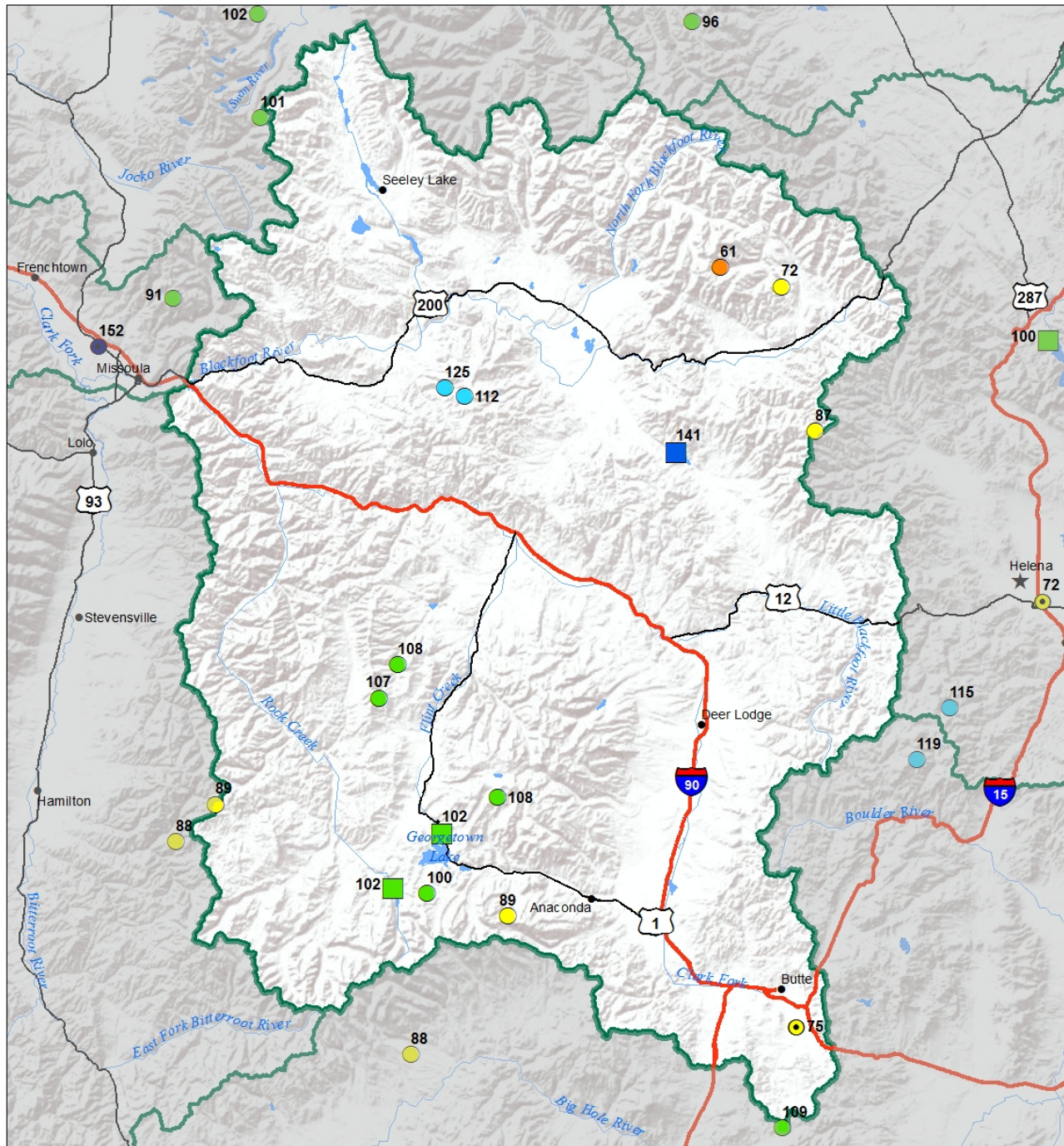
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%

Snowcourse

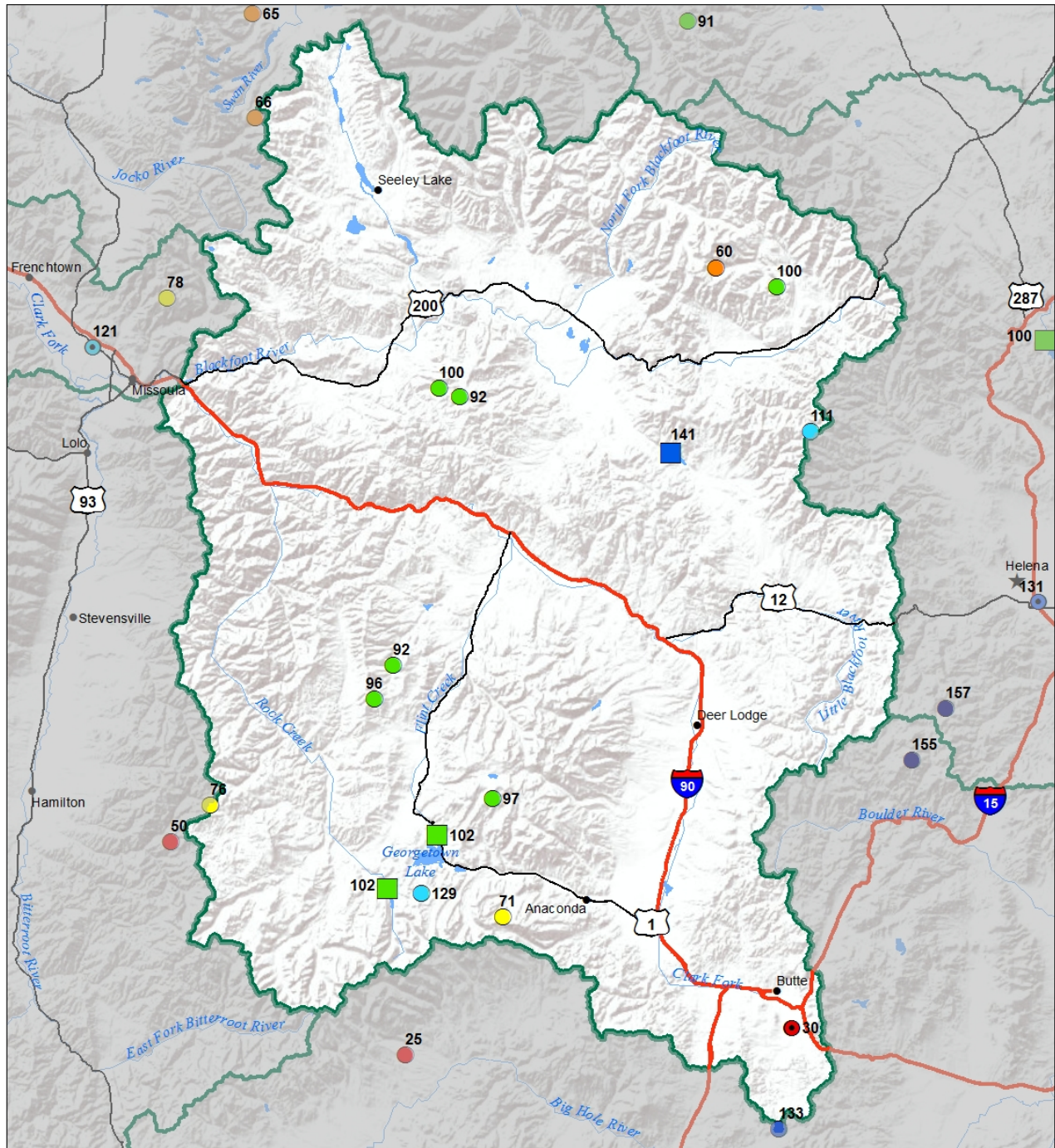
- ✚ > 150%
- ✚ 131 - 150%
- ✚ 111 - 130%
- ✚ 91 - 110%
- ✚ 71 - 90%
- ✚ 51 - 70%
- ✚ 1 - 50%
- ✚ 0%



Upper Clark Fork River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019



Upper Clark Fork River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019 (January 1, 2019 - February 1, 2019)



**Precipitation
Percent of Normal**

SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

COOP/ACIS

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

**Reservoirs
Percent of Normal**

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%



Bitterroot River Basin



Snowpack in the Bitterroot River basin is near to slightly below normal for Feb 1st, with snowpack totals dropping from Jan 1st due to below normal snowfall during the month. The month began dry with under high pressure, but the second week brought snowfall to the basin before yielding again to high pressure. This lasted until the third week of the month when multiple storms impacted the basin from January 16th- 27th. The storm totals were impressive in some areas, [Twin Lakes SNOTEL](#) added 4.0" of Snow Water Equivalent (SWE) to the snowpack during this time, stopping the decline in daily percentages, and keeping the site at 93% of normal on Feb 1st. Totals at other sites in the basin weren't as high (1.2" to 2.5" of SWE), but it was enough to keep totals from taking a nose dive before February 1st. While the totals from the major storms at the end of the month helped, the month overall was below normal. Snowpack on Feb 1st ranges from 75% to 85% in the southern Bitterroot, 85% to 86% in the Sapphire Range, and 93% to 98% in the Lost Horse drainage in the Western Bitterroot. At this point in the year about 60-70% of the annual peak mountain snowpack has typically accumulated on Feb 1st, and the months ahead will determine the extent of water resources we have from snowpack this spring and summer.

Bitterroot River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
WEST FORK BITTERROOT	78%	120%
EAST SIDE BITTERROOT	81%	120%
WEST SIDE BITTERROOT	91%	113%
Basin-Wide Snowpack	87%	115%

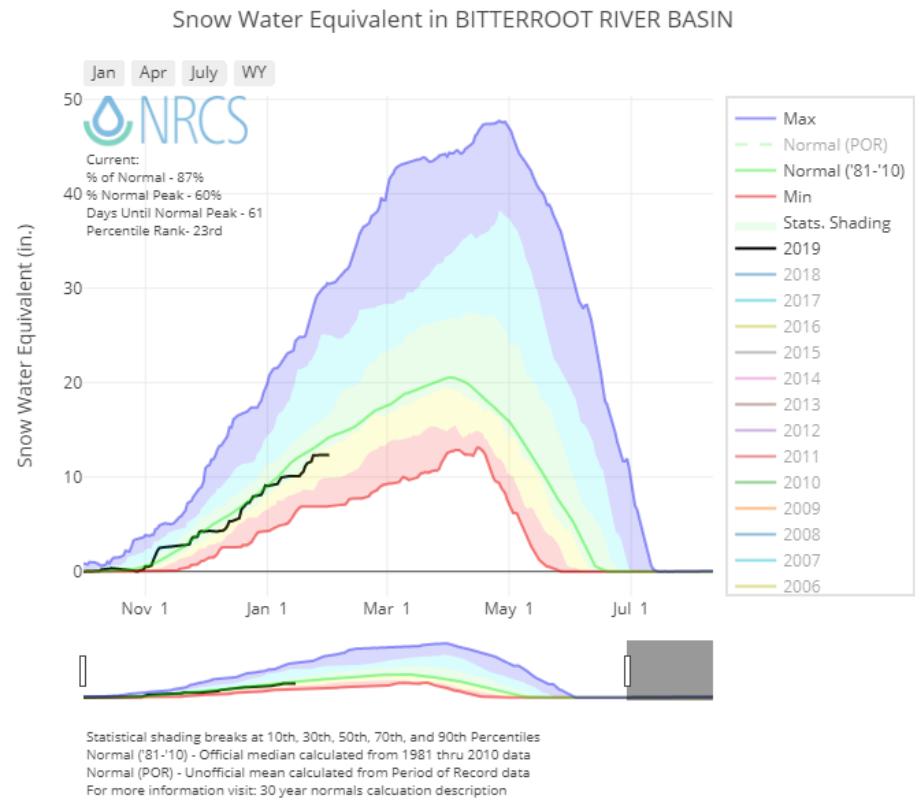
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	65%	95%	107%
Valley Precipitation	%	%	%
Basin-Wide Precipitation	65%	95%	107%

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

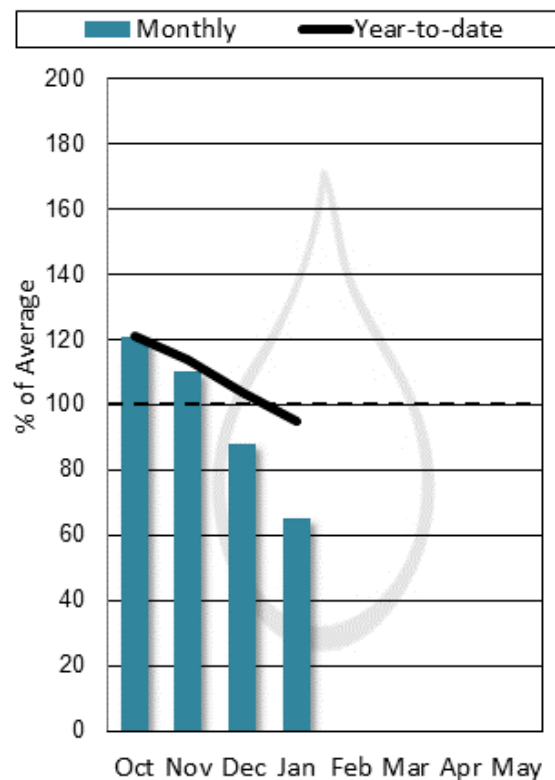
	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	119%	30%	137%

*See Reservoir Storage Table for storage in individual reservoirs

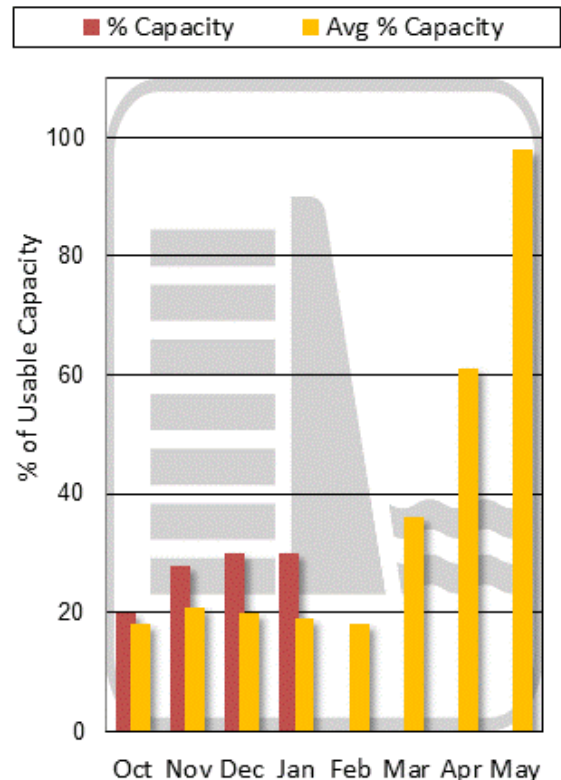
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley Precipitation

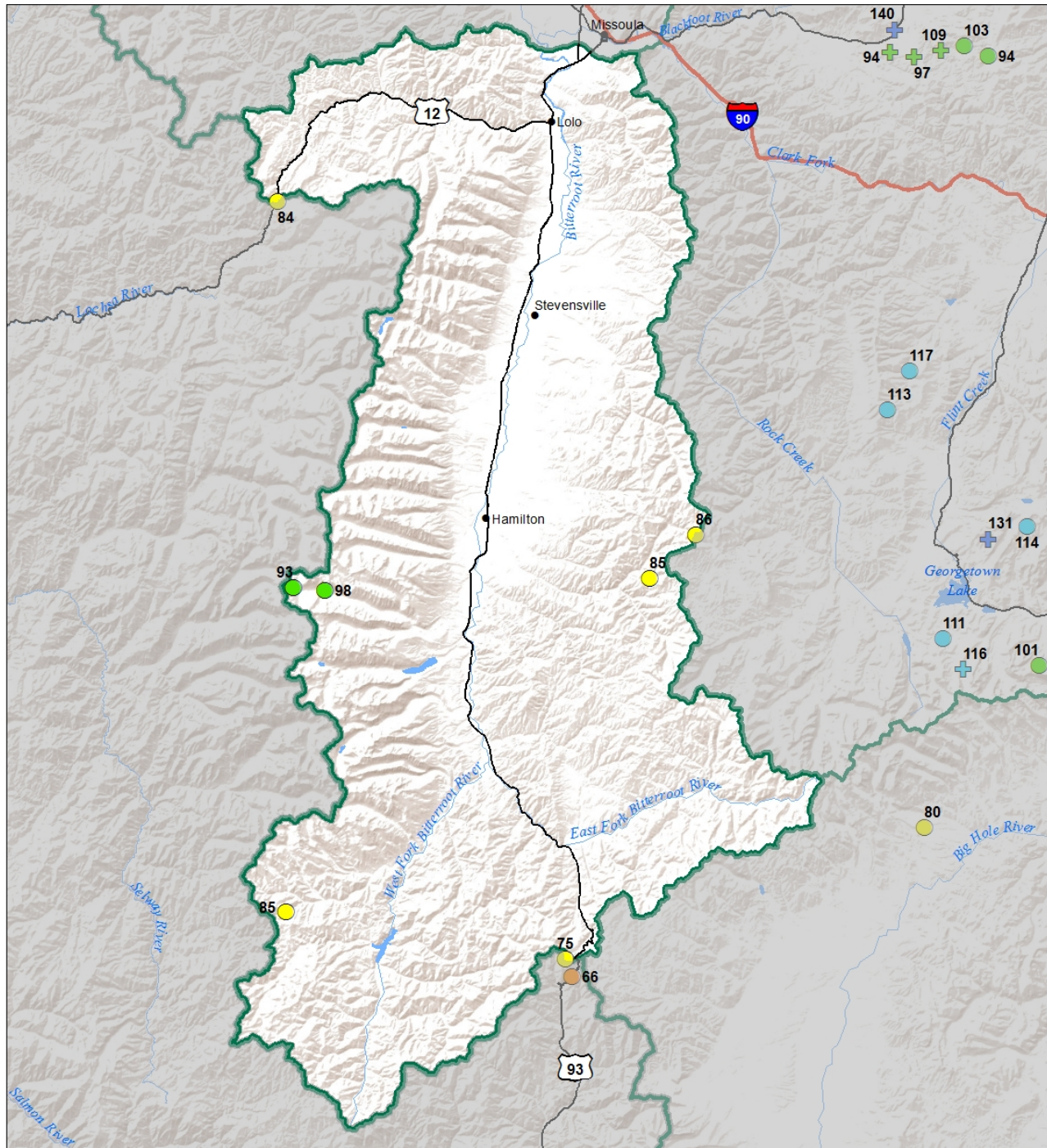


End of Month Reservoir Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

Bitterroot River Basin Snow Water Equivalent Percentage of Normal February 1, 2019



Snow Water Equivalent Percent of Normal

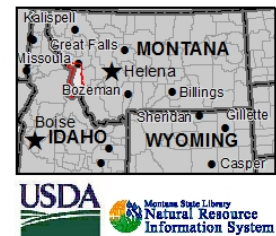
SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%

Snowcourse

- ✚ > 150%
- ✚ 131 - 150%
- ✚ 111 - 130%
- ✚ 91 - 110%
- ✚ 71 - 90%
- ✚ 51 - 70%
- ✚ 1 - 50%
- ✚ 0%

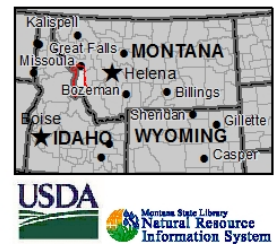
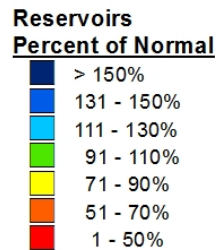
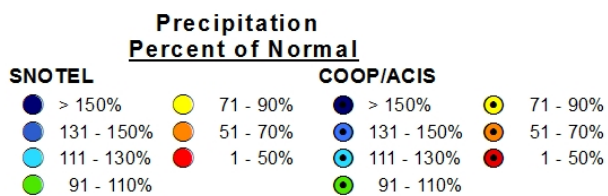
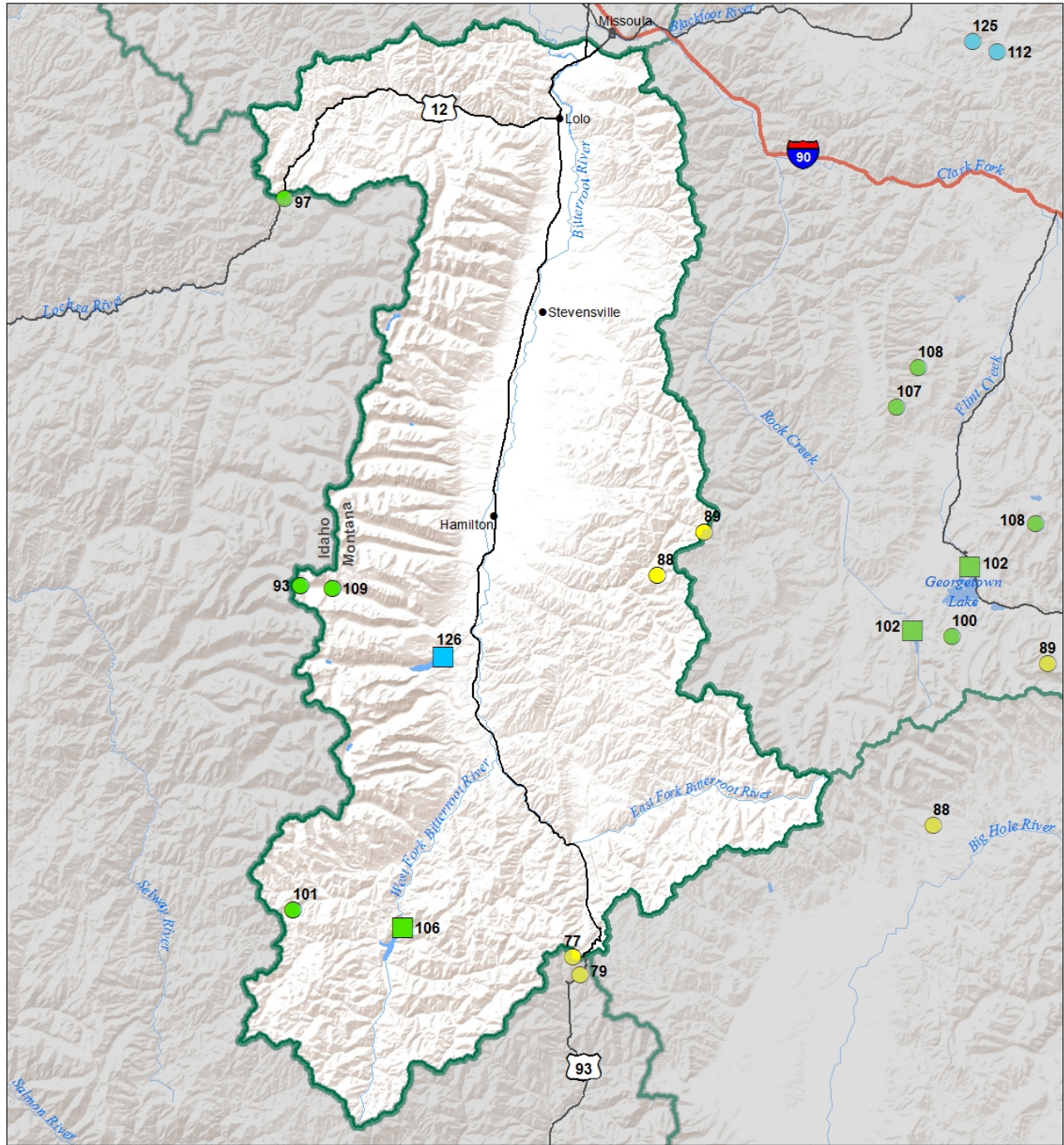


Bitterroot River Basin

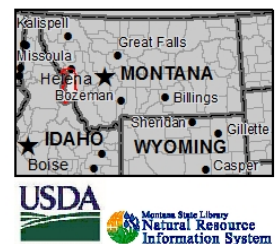
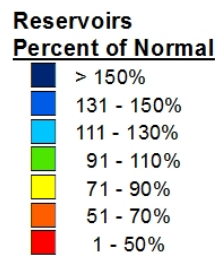
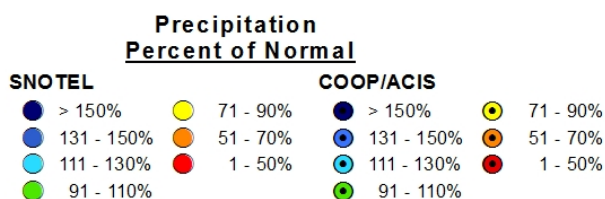
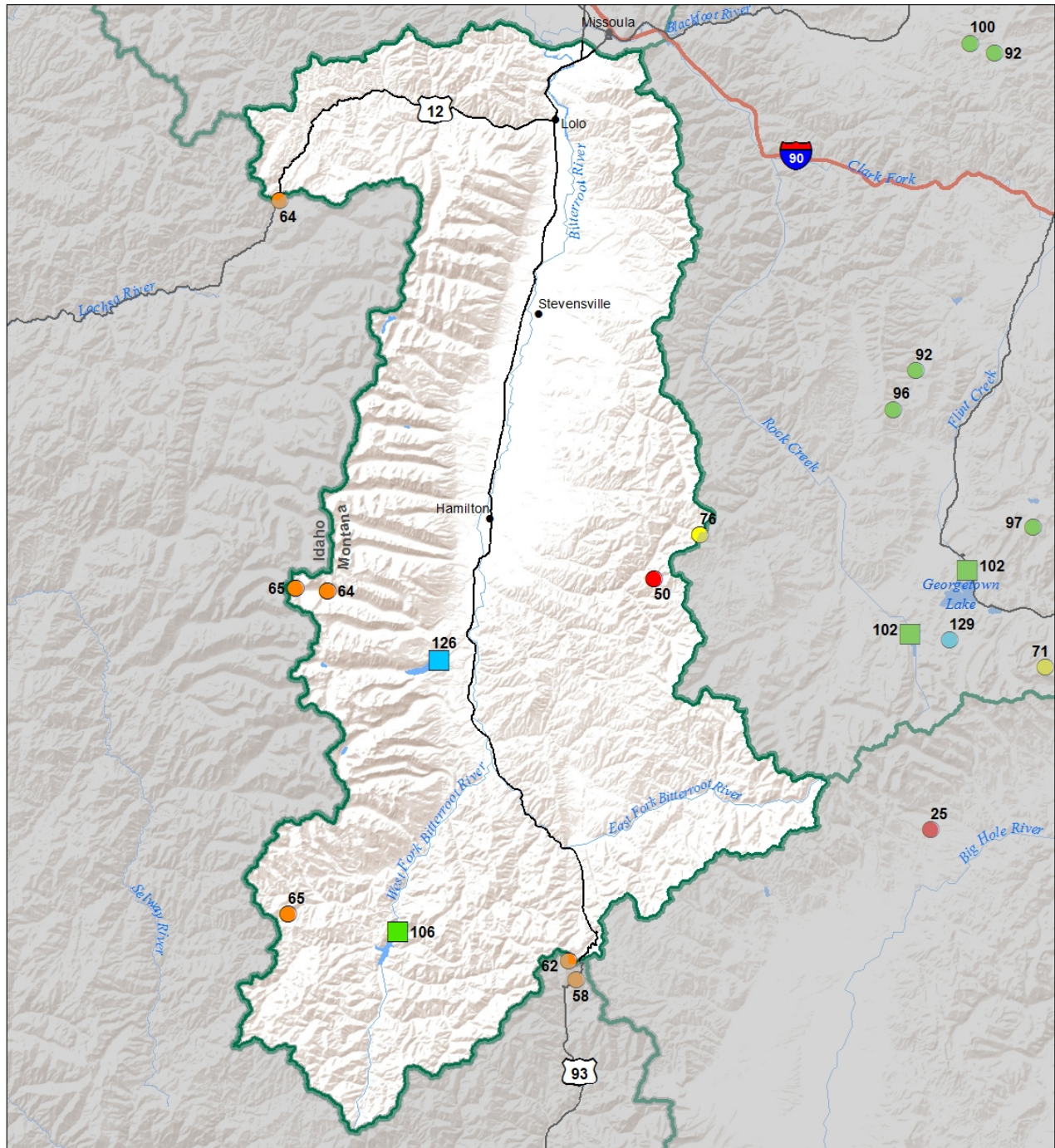
Water Year to Date Precipitation and Reservoir Levels

Percentage of Normal

February 1, 2019



Bitterroot River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019 (January 1, 2019 - February 1, 2019)



Lower Clark Fork River Basin



Like most of western Montana, the snowpack in the Lower Clark Fork mountains is below normal on February 1st. Shortly after the first of January, snowfall in the basin added to the seasonal snowpack but a prolonged period of high pressure that followed caused declines in snowpack percentages. On January 17th, snow started falling with earnest in the basin, and multiple storms delivered significant snow totals. [Stuart Mountain SNOTEL](#) added 2.9" of Snow Water Equivalent (SWE) to the snowpack during this time, to the delight of Snowbowl skiers nearby. Unfortunately, the storms at the end of the month weren't enough to keep monthly snow totals near normal for January, and snowfall was only 49% to 80% of normal. This built on an already below normal snowpack on Jan 1st, causing a decline in the site and basin-wide snowpack percentages on Feb 1st. Snowpack is below normal at all sites in the basin at this time. Hoodoo Basin SNOTEL has been down since December 28th, 2018 but was repaired by the Snow Survey staff on January 31st. The Snow Staff was unable to travel during the lapse in federal appropriations, hence the prolonged period without information from the site. We're happy to have it back up and running, and we heard from many regarding the importance of this site. At this point roughly 60% to 70% of the seasonal snowpack has accumulated, so time is running out to make a recovery to "normal" snowpack before runoff begins. While it is more difficult to make a recover in February and March, it's not impossible.

Lower Clark For River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
LOWER CLARK FORK RIVER BASIN	84%	84%
Basin-Wide	84%	113%

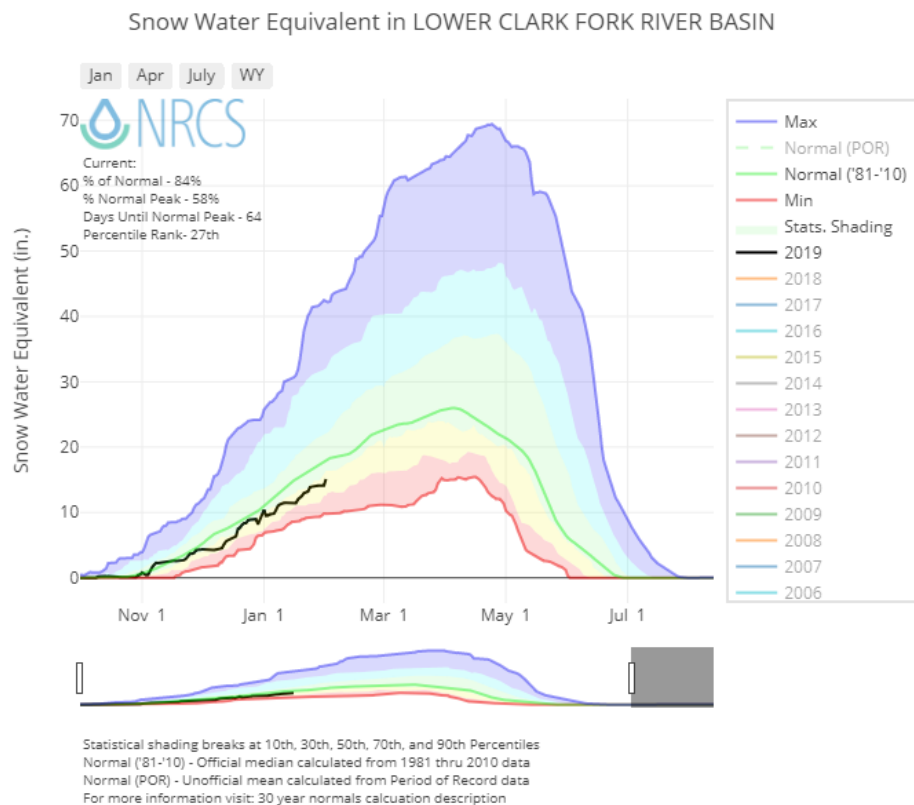
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	65%	87%	113%
Valley Precipitation	121%	152%	121%
Basin-Wide Precipitation	66%	88%	113%

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

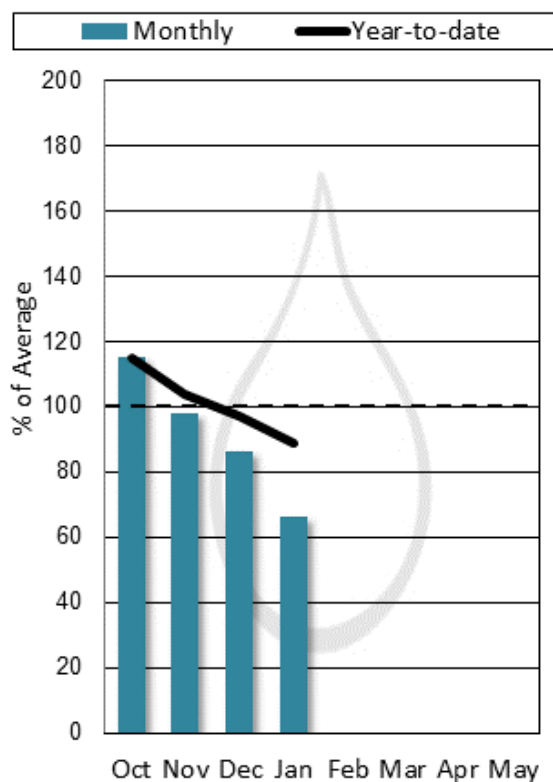
Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	97%	91%	96%

*See Reservoir Storage Table for storage in individual reservoirs

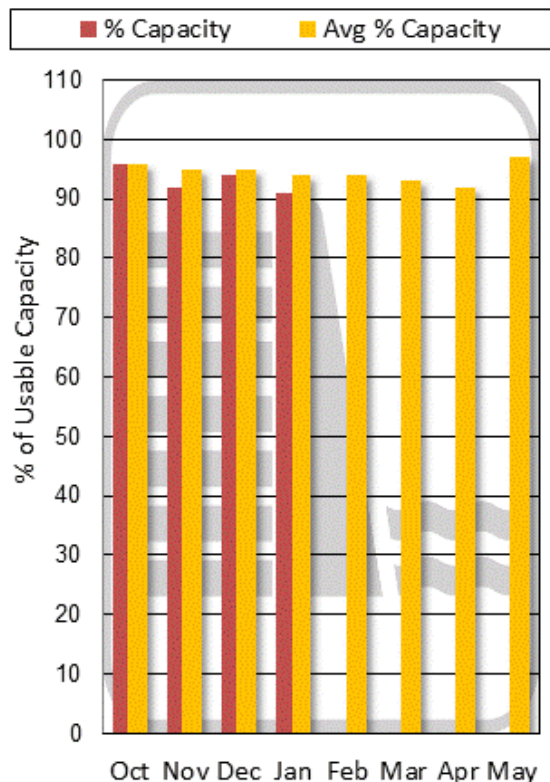
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley Precipitation

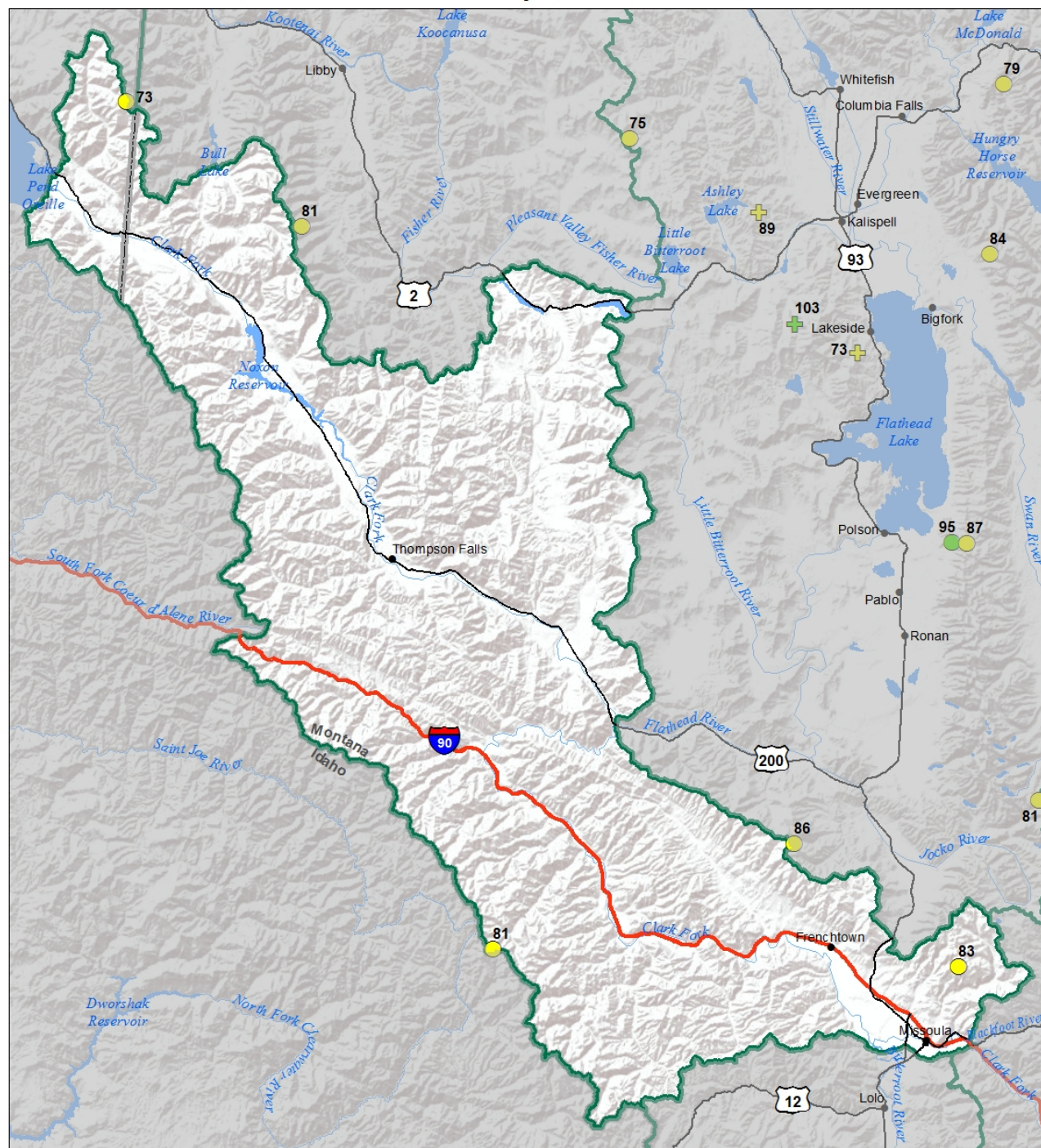


End of Month Reservoir Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

Lower Clark Fork River Basin Snow Water Equivalent Percentage of Normal February 1, 2019



Snow Water Equivalent Percent of Normal

SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

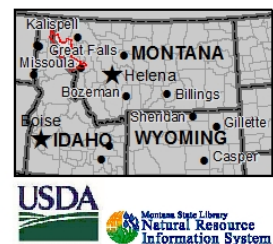
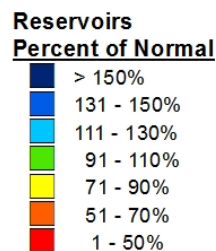
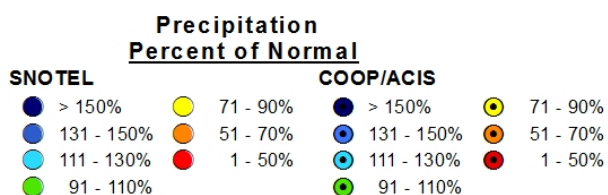
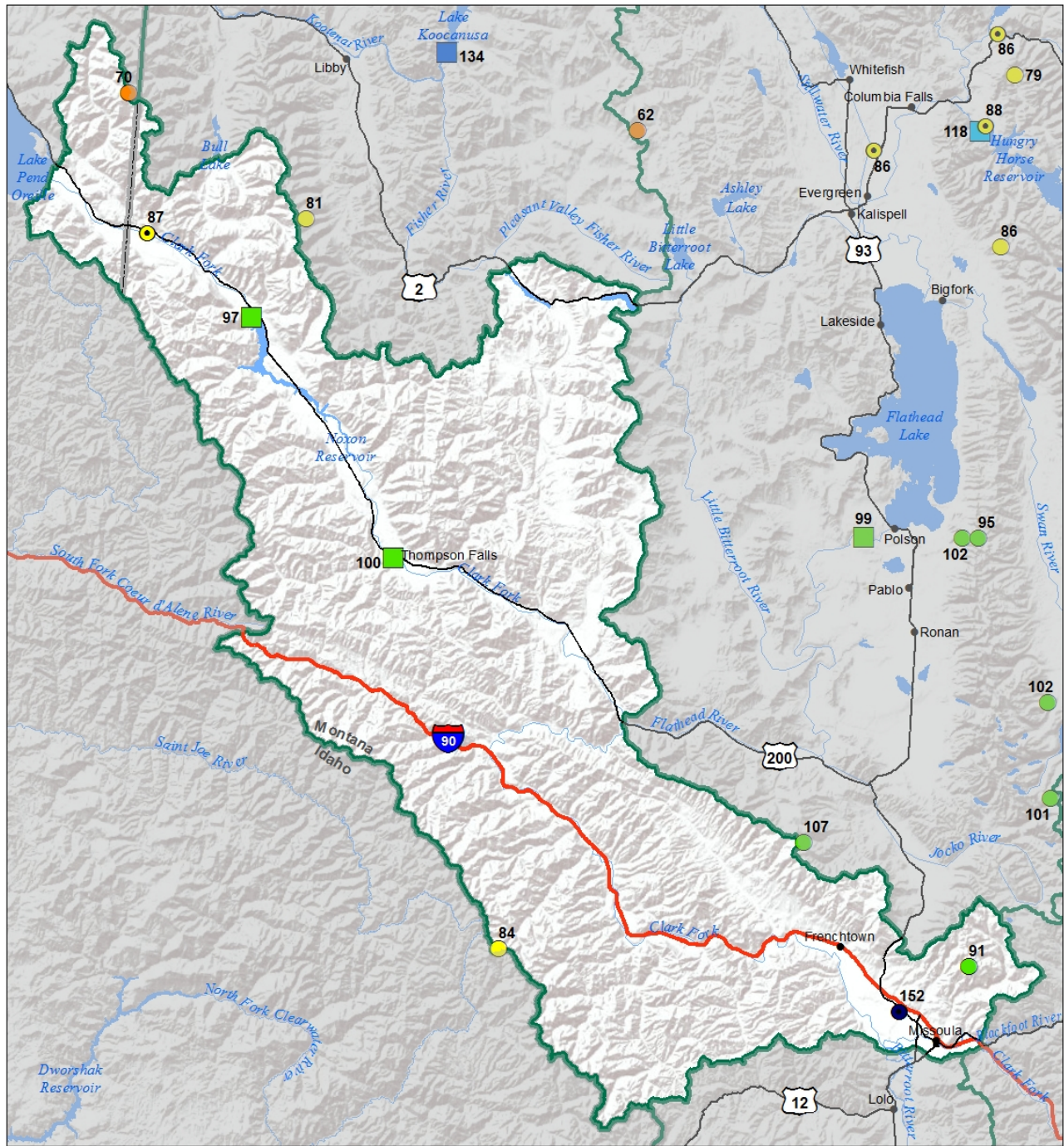
- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%

Snowcourse

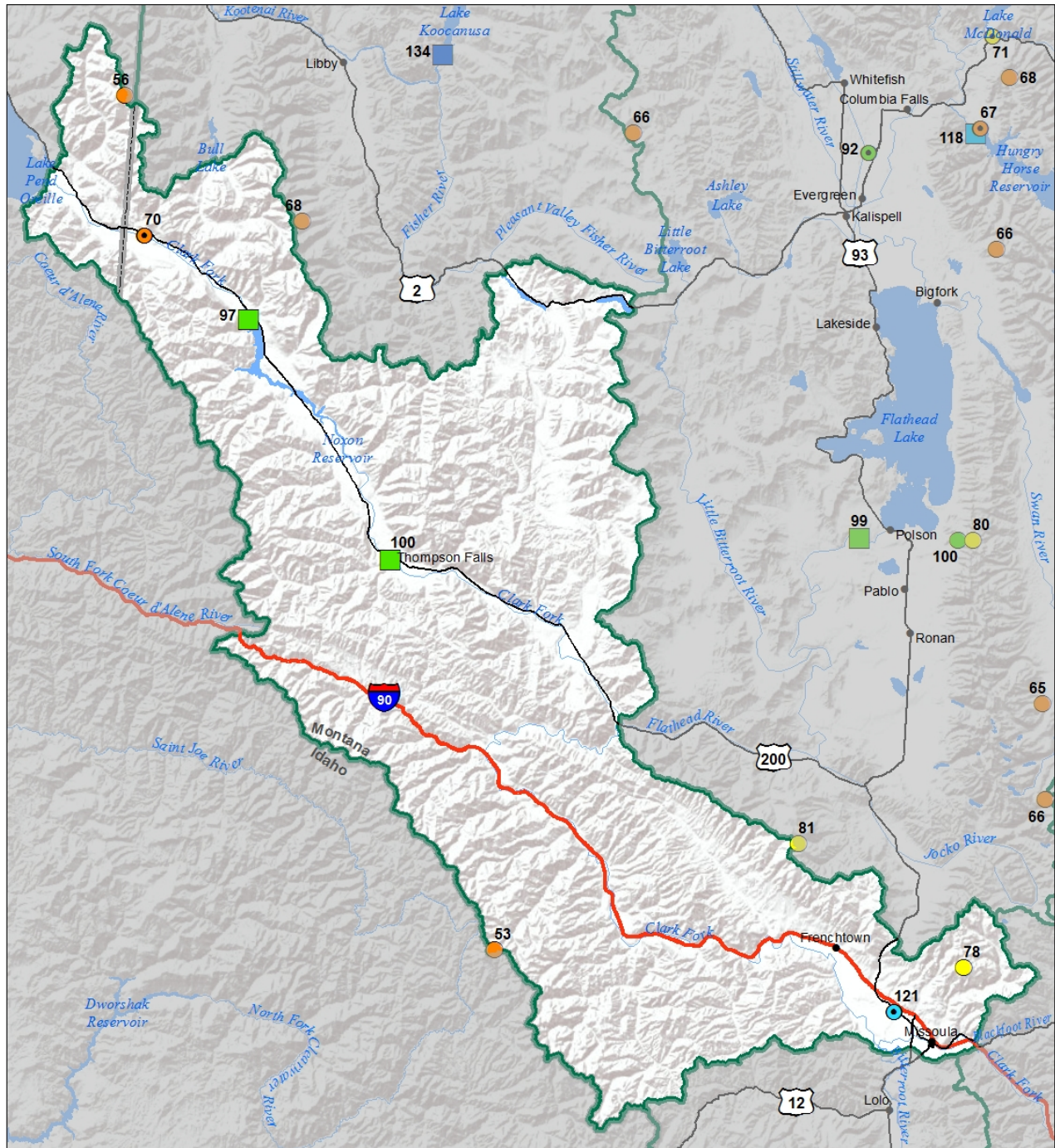
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%



**Lower Clark Fork River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019**



Lower Clark Fork River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019 (January 1, 2019 - February 1, 2019)



**Precipitation
Percent of Normal**

SNOTEL

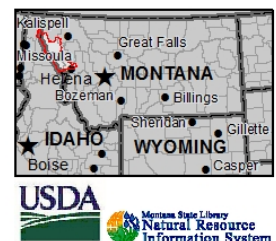
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

COOP/ACIS

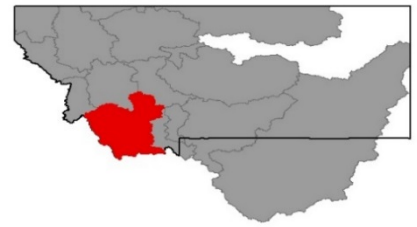
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

**Reservoirs
Percent of Normal**

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%



Jefferson River Basin



Snowpack in the greater Jefferson River basin varies by which sub-basin you're looking at. All basins got off to a strong start in November, before high pressure and dry weather patterns slowed snowpack accumulation. January got off to a slow start with all sub-basins receiving below normal snowfall under continued high pressure. Fortunately, the weather pattern change during the latter half of the month yielded snowfall that brought the [Ruby](#) and [Boulder](#) River basins back to normal for Feb 1st, and helped the [Beaverhead](#) and [Big Hole](#) River basins increase their snowpack percentages before the month ended. The southern basins are below normal for this date and have been in this category since mid-November. Storms at the end of the month favored the northern and eastern halves of the basin, but while these regions received 2 to 3" of Snow Water Equivalent (SWE) over the month, the southern and western halves of the basin received 1 to 2" of SWE. One area that is noticeably dry is the mid elevations on the northern side of the Centennial Range. [Lakeview Ridge SNOTEL](#) is currently 42% of normal for Feb 1st and has been near record low at times so far this water year. Sites on the north end of the Red Rocks Valley in the southern Gravelly Range are in better shape and are 81% to 87% of normal. Winter is a long way from being over and there is time to recover in the basins where snow totals remain low. Spring (March – May) typically yields a significant portion of the annual snowpack before peak snowpack occurs and will be important this year with low snow totals in some basins on Feb 1st. Reservoir storage in the basin remains above average, which is the silver lining in the Red Rock and Beaverhead river basins.

Jefferson River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
BEAVERHEAD	80%	114%
RUBY	95%	123%
BIGHOLE	86%	133%
BOULDER	113%	150%
Basin-Wide Snowpack	91%	127%

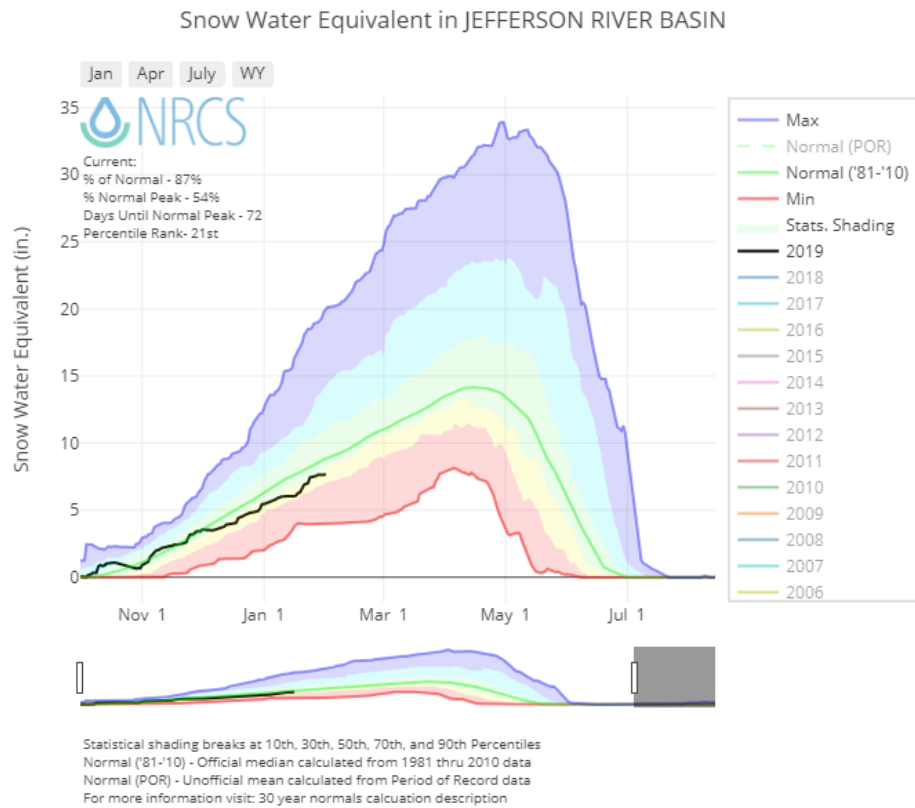
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	82%	91%	99%
Valley Precipitation	%	%	%
Basin-Wide Precipitation	82%	91%	99%

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

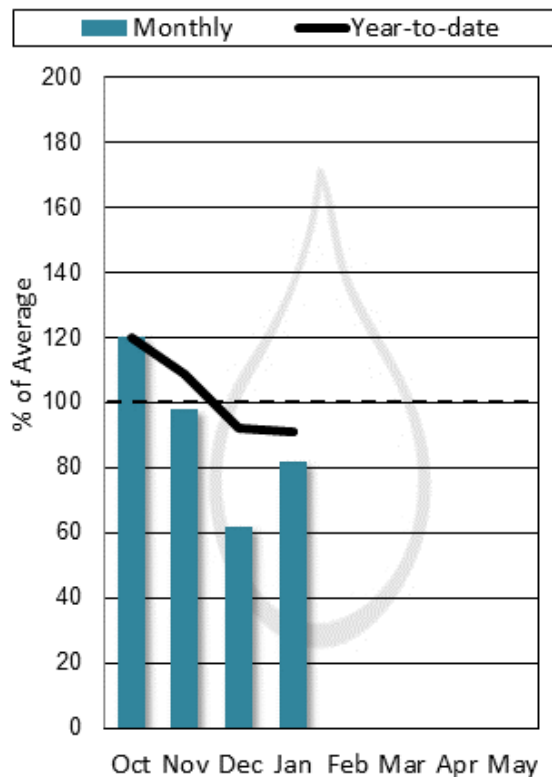
Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	131%	60%	129%

*See Reservoir Storage Table for storage in individual reservoirs

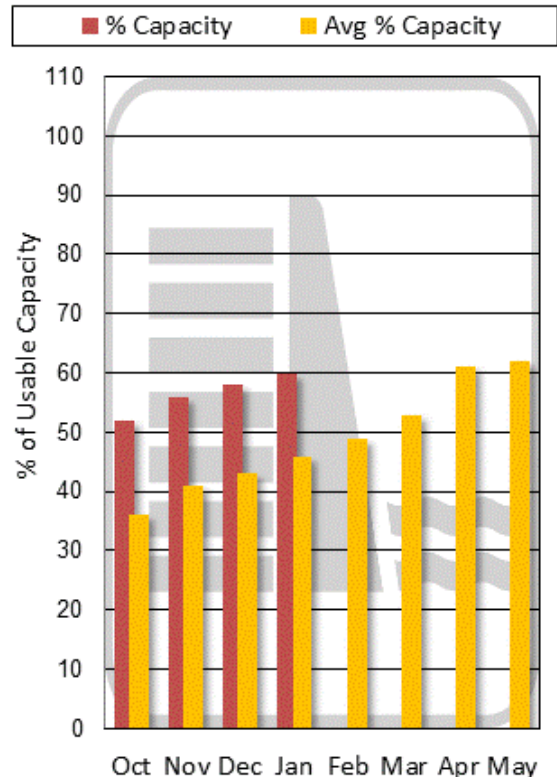
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley Precipitation

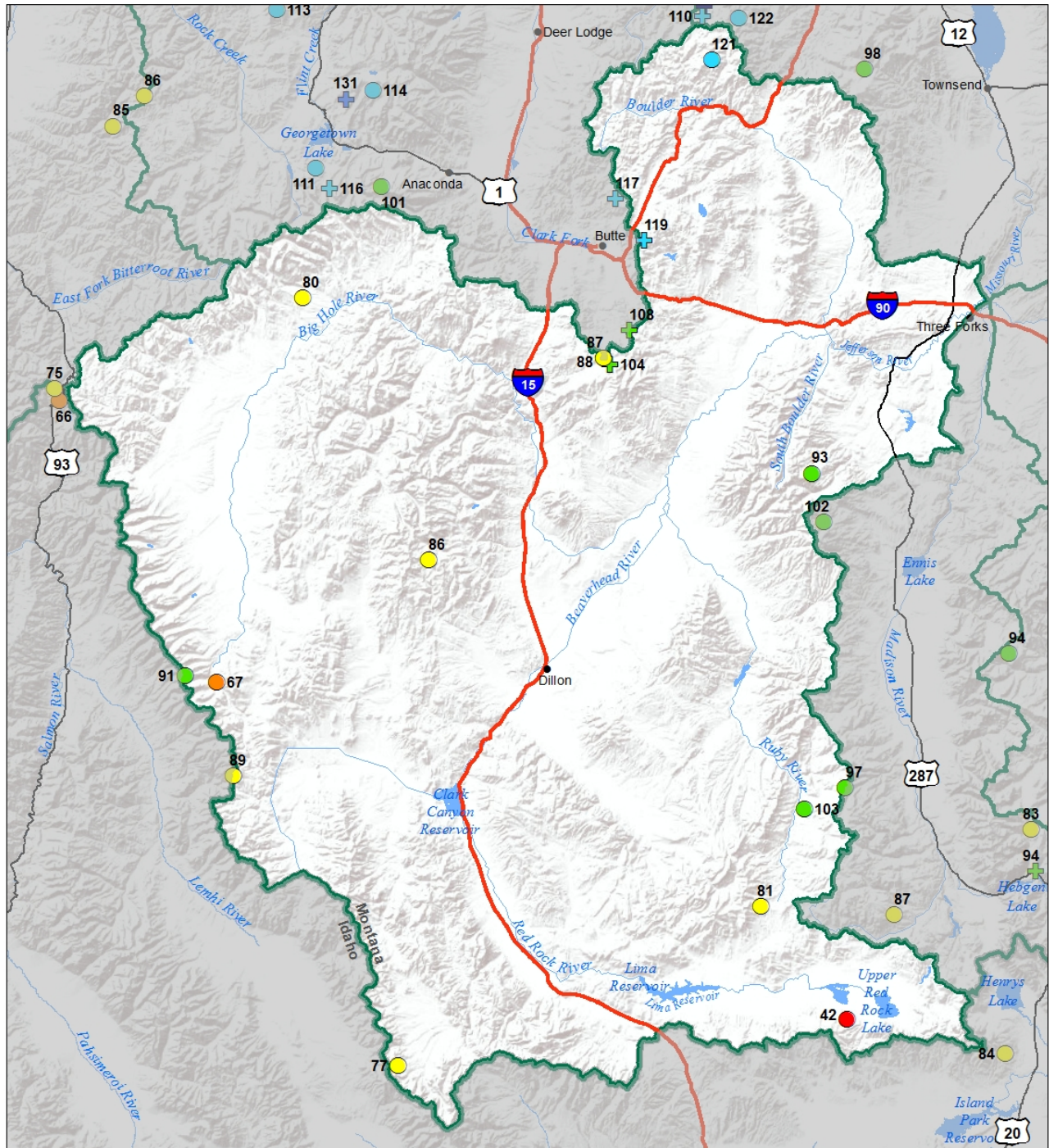


End of Month Reservoir Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

Jefferson River Basin Snow Water Equivalent Percentage of Normal February 1, 2019



Snow Water Equivalent Percent of Normal

SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%

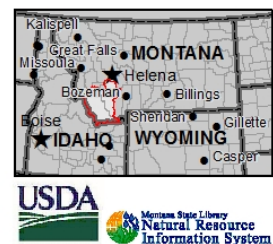
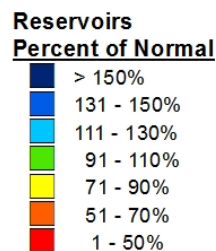
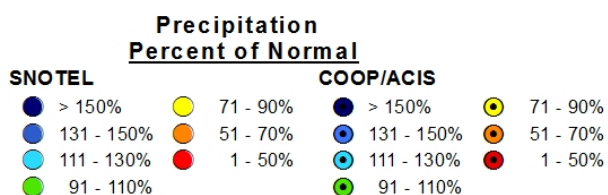
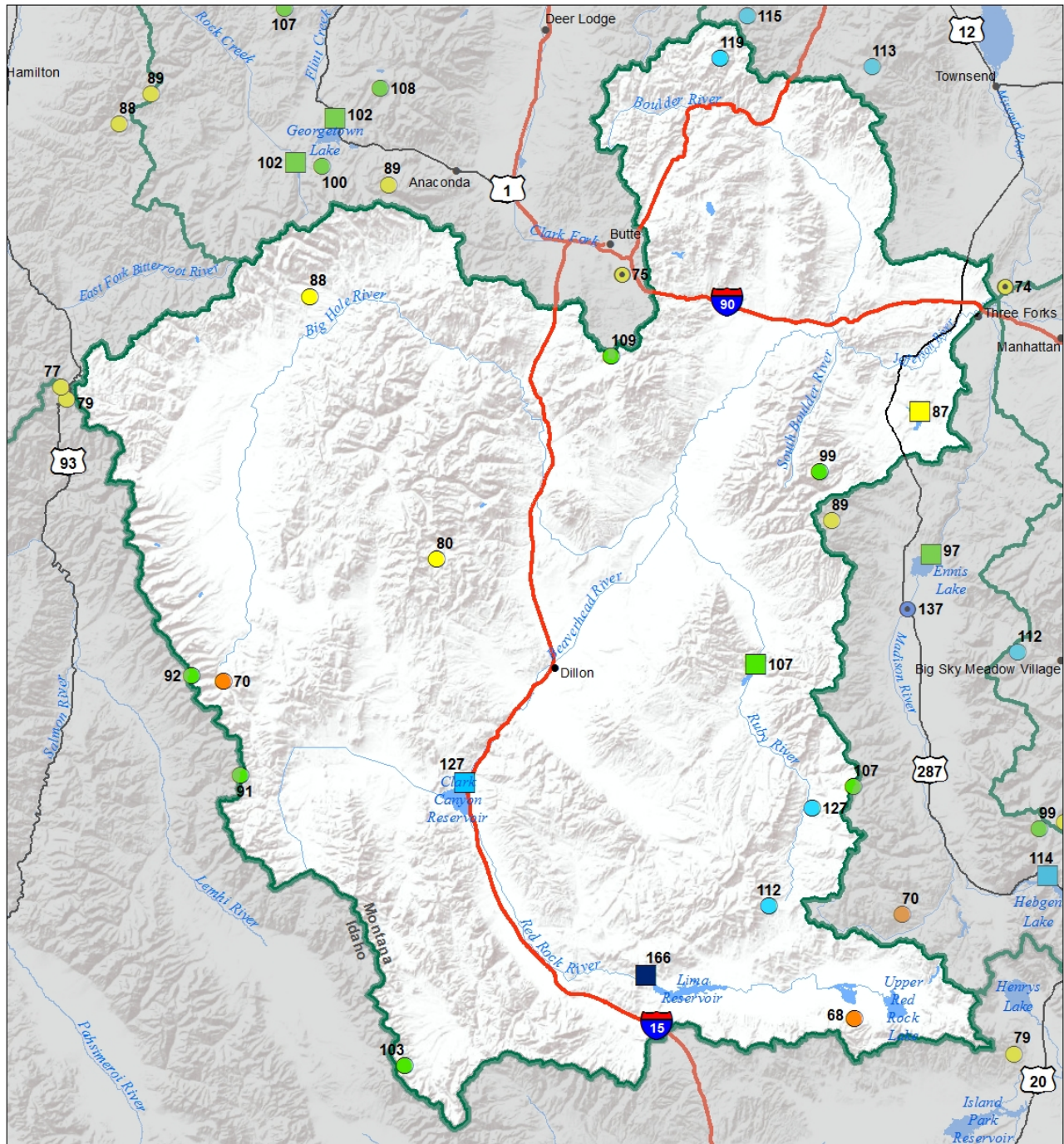
Snowcourse

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

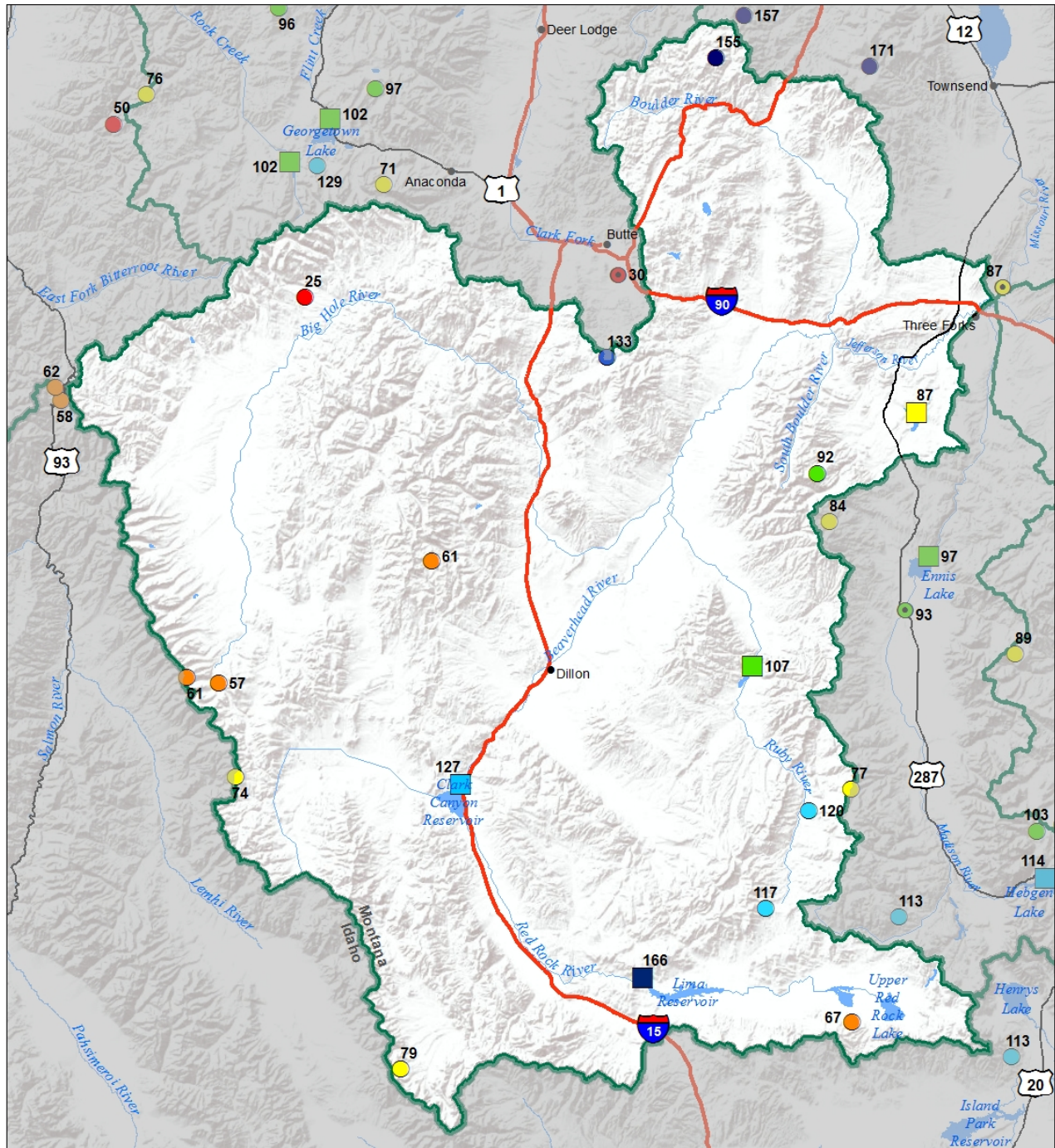
- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%



Jefferson River Basin Water Year to Date Precipitation and Reservoir Levels Percentage of Normal February 1, 2019



Jefferson River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019 (January 1, 2019 - February 1, 2019)



**Precipitation
Percent of Normal**

SNOTEL

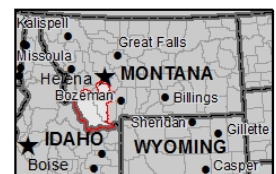
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

COOP/ACIS

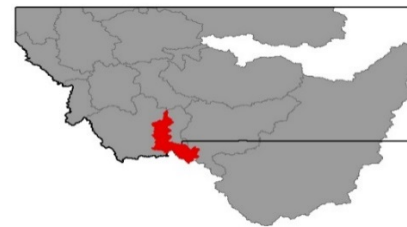
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

**Reservoirs
Percent of Normal**

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%



Madison River Basin



After an impressive storm dumped feet of snow in the Upper Madison River basin during the latter half of January, it would be easy to assume that conditions must have improved in the area that feeds Hebgen Lake. Well, they have, but not as much as we hoped. [Black Bear SNOTEL](#), which received 6.7" of Snow Water Equivalent during the month (~40"), remains below normal at 78% on Feb 1st. Surrounding sites in the Upper Madison range from 72% to 86% of normal. This is still an improvement from Jan 1 where snow totals ranged from 50% to 73% in the Upper Madison, just not as much of an improvement as you might expect. Fortunately, as you move north in the basin snowpack conditions improve and are closer to normal for this date. Snowpack in the Gravelly and Madison Ranges is slightly below normal, and near to above normal in the Tobacco Root range. The good news for irrigators and fishermen is that both Hebgen Lake and Ennis Lake are above average for storage on Feb 1st, which can help to offset low snow totals if conditions don't improve through the rest of winter into spring. The Madison River basin typically experiences its biggest snow months from March through May, which could help to improve deficits we've experienced so far. However, low totals on this date put us behind and more reliant on that to play out. This month's above average snowfall was a great first step in the right direction, but we'll have to see how the rest of the snow season plays out. Fingers crossed.

Madison River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
MADISON abv HEBGEN LAKE	77%	113%
MADISON blw HEBGEN LAKE	91%	115%
Basin-Wide Snowpack	85%	114%

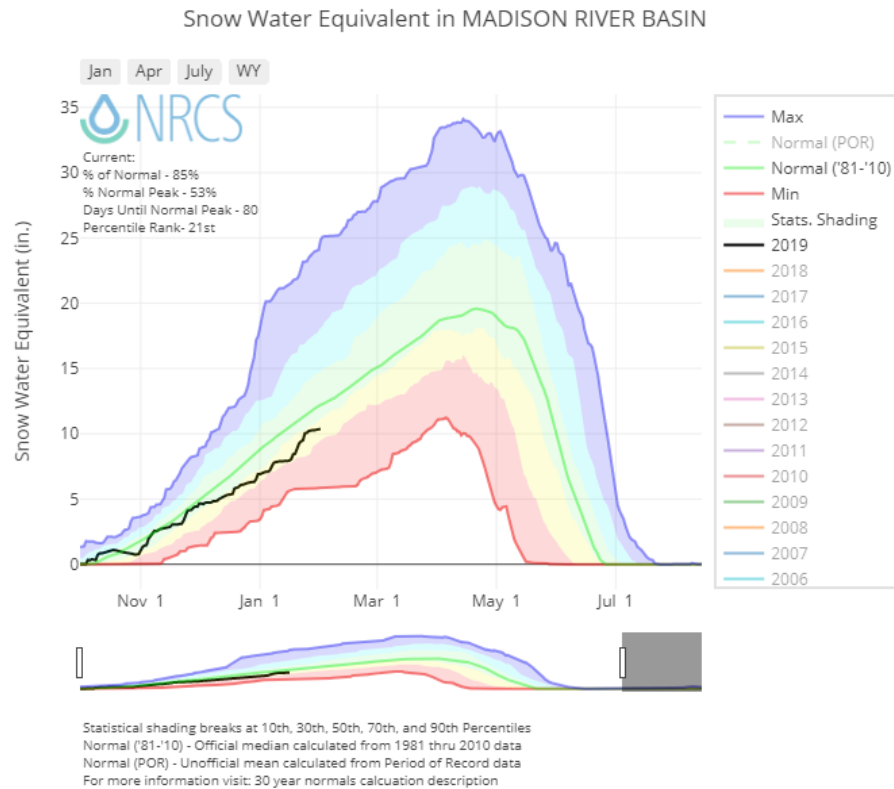
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	91%	85%	102%
Valley Precipitation	93%	137%	137%
Basin-Wide Precipitation	91%	86%	103%

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

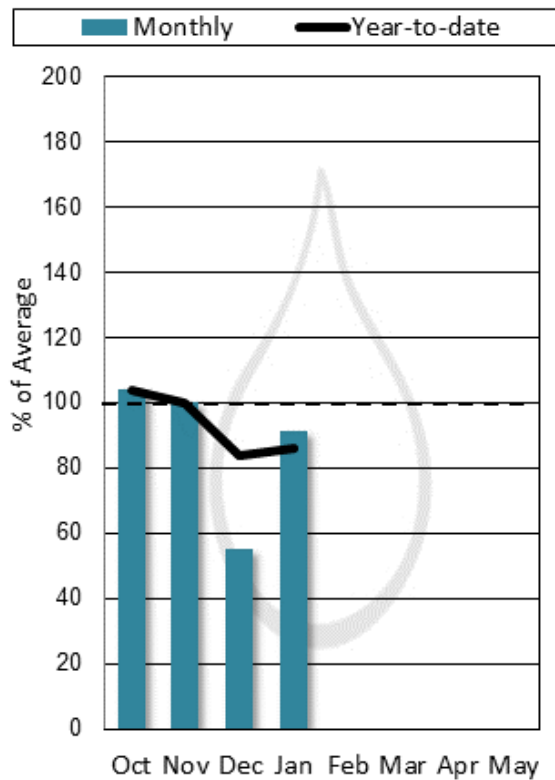
Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	112%	82%	114%

*See Reservoir Storage Table for storage in individual reservoirs

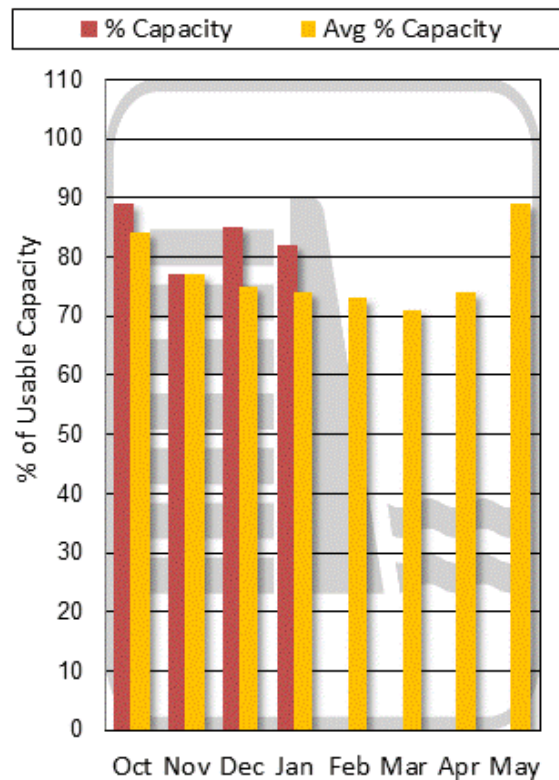
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley Precipitation

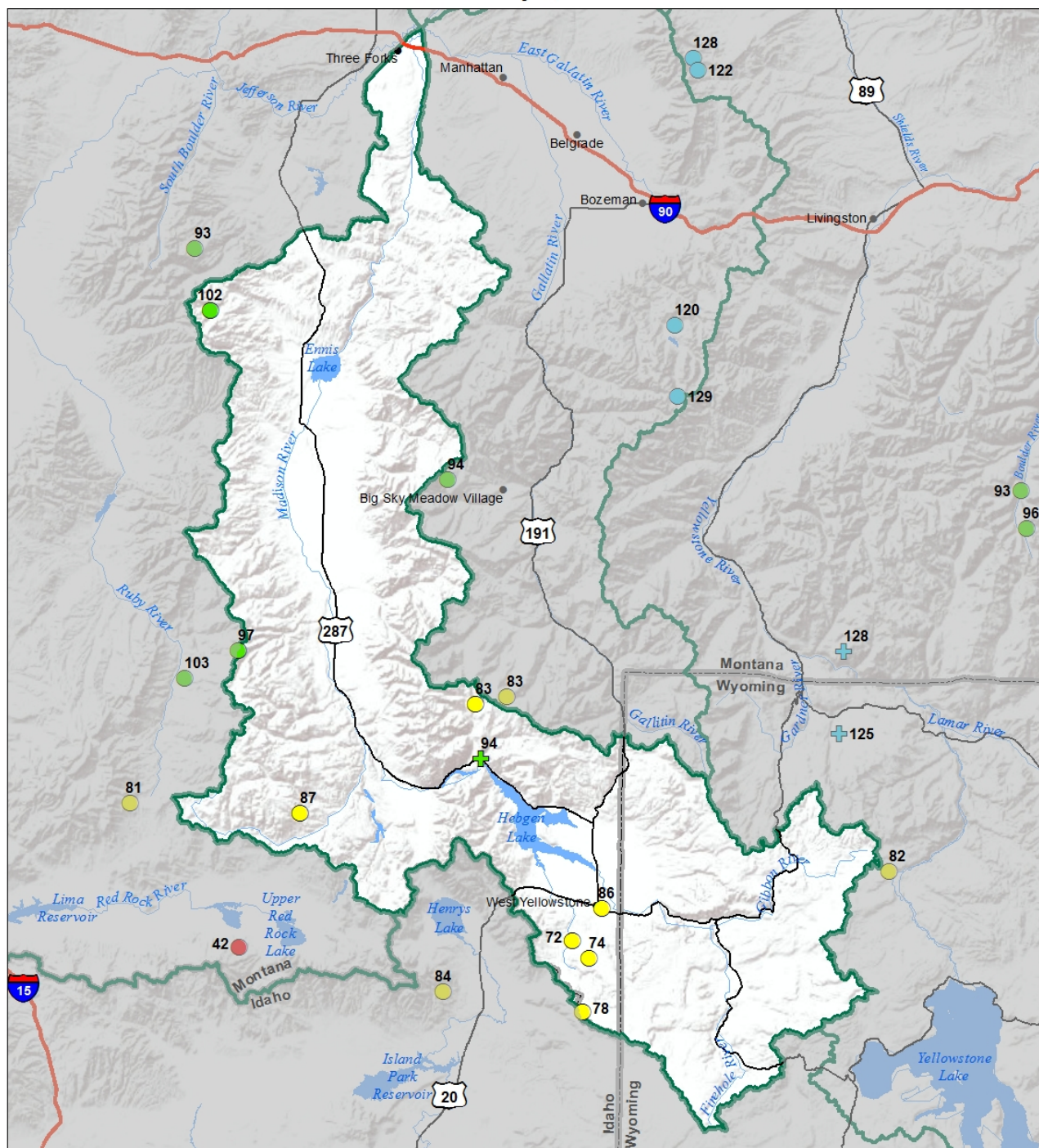


End of Month Reservoir Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

Madison River Basin Snow Water Equivalent Percentage of Normal February 1, 2019



Snow Water Equivalent Percent of Normal

SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%

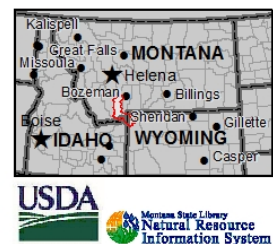
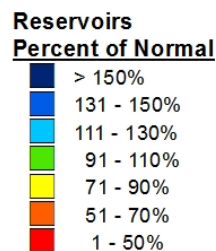
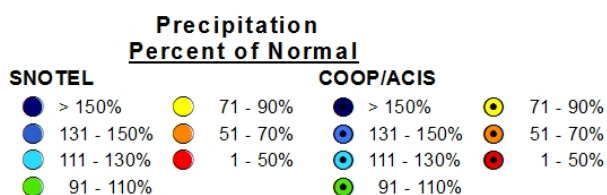
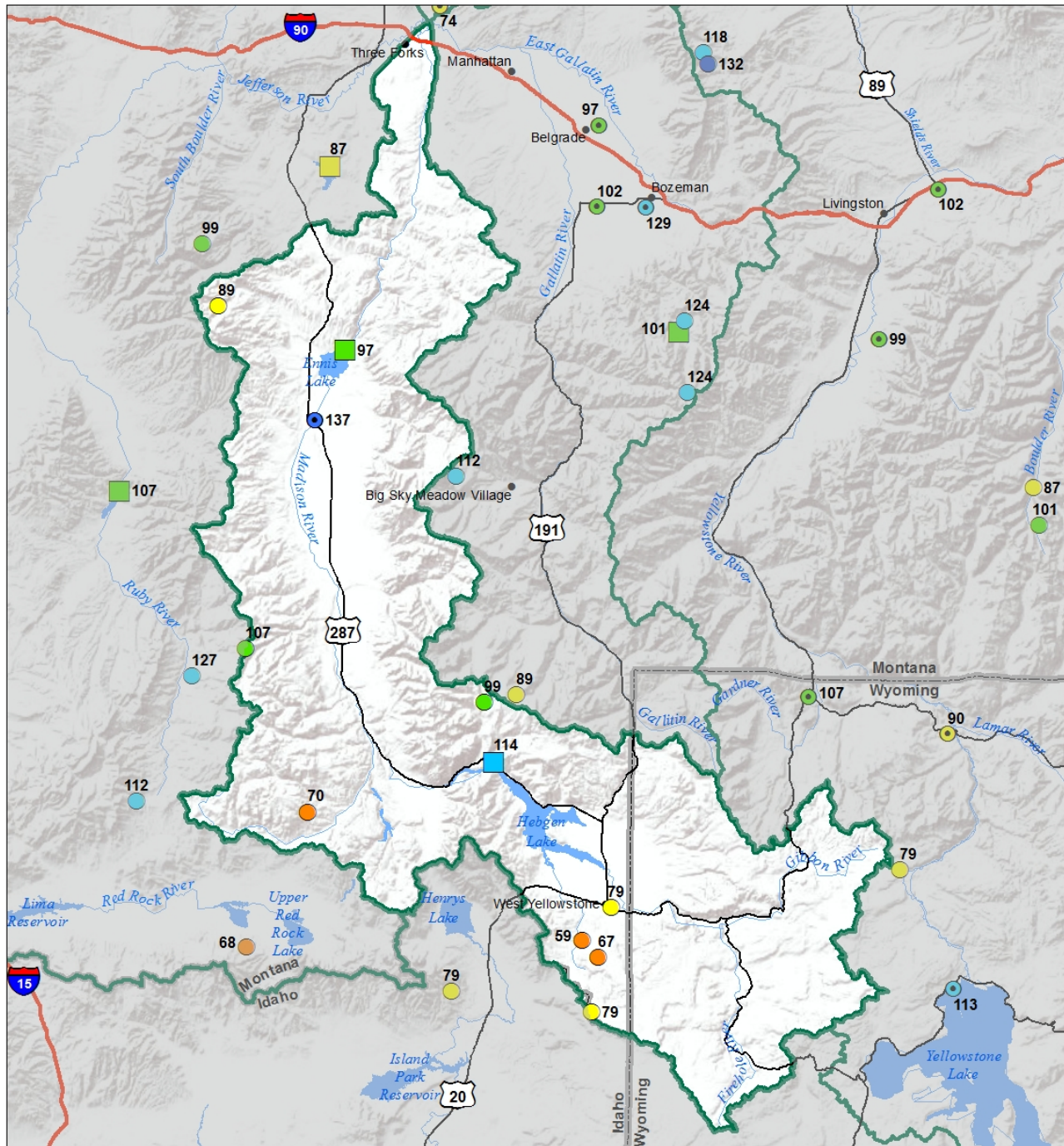
Snowcourse

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

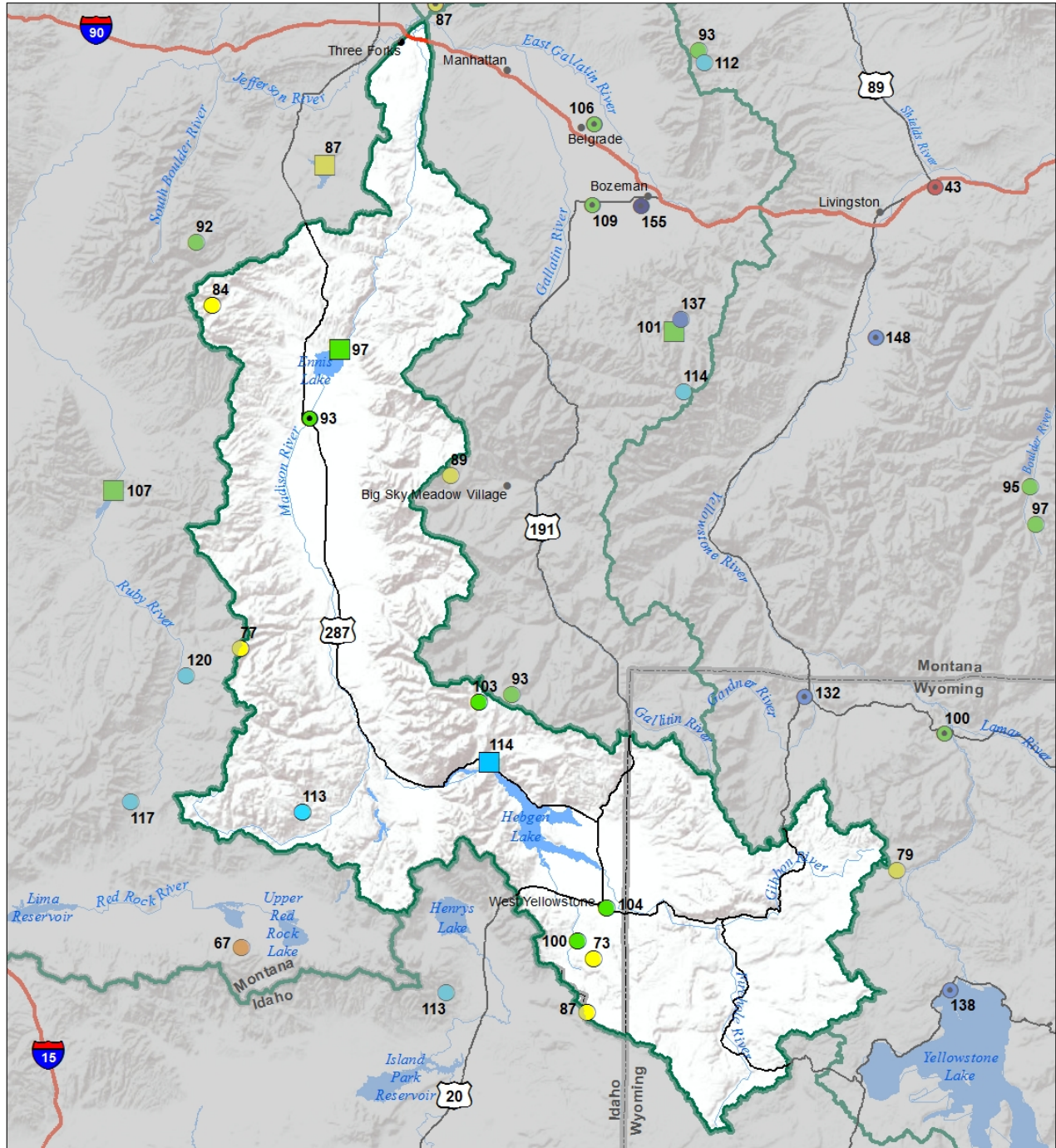
- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%



Madison River Basin Water Year to Date Precipitation and Reservoir Levels Percentage of Normal February 1, 2019



Madison River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019 (January 1, 2019 - February 1, 2019)



Precipitation
Percent of Normal

SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

COOP/ACIS

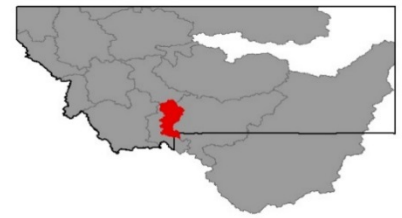
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%



Gallatin River Basin



17 Days. That's how long the snowmobilers and skiers in the Gallatin River basin had to wait after the New Year started for favorable storm patterns to play out and drop snow in the Gallatin River basin. High pressure dominated the first half of the month and there was little meaningful snowfall during this time. What fell during the latter half of the month was impressive. Typically, January yields 1.5" to 4.0" of Snow Water Equivalent over the course of the month, and this year an entire month of snow fell during a 10-day period in January. Across the basin, [2.3" to 3.9" of Snow Water Equivalent \(SWE\) was added to the snowpack between January 17th-28th](#), enticing eager riders and skiers, who flocked to the mountains like a hungry swarm of powder locusts, clogging highways and trailheads in the region. With regards to water resources, the Gallatin River basin overall is in good shape across state of Montana on Feb 1st with snowpack at 106% of normal. [Conditions vary across the basin](#), the northern regions (Bridger and Northern Gallatin Ranges) have snowpack which is well above normal for this time, while the headwaters of the mainstem of the Gallatin in the southern Madison and Gallatin Ranges have snowpack that is near to slightly below normal for Feb 1st. Spring is the time when we are climatologically favored to have our biggest snow months, so the deficits in the headwaters could be made up if favorable weather patterns (storms approaching from the southwest) make an appearance this spring.

Gallatin River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
UPPER GALLATIN	86%	118%
HYALITE	126%	149%
BRIDGER	126%	145%
Basin-Wide Snowpack	106%	132%

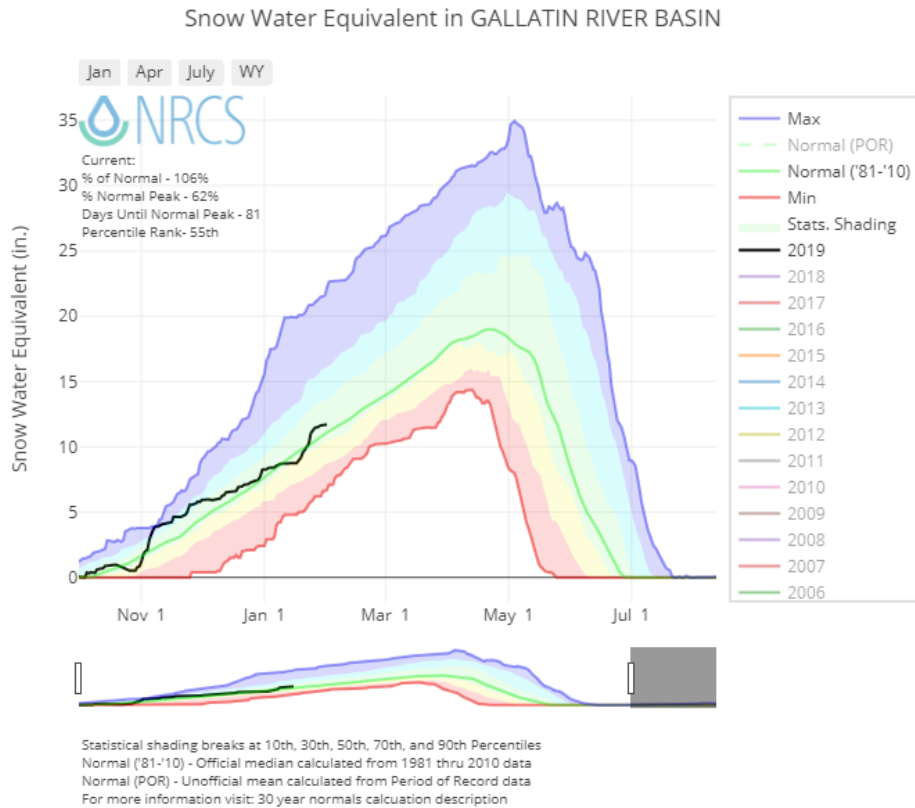
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	103%	113%	120%
Valley Precipitation	137%	117%	125%
Basin-Wide Precipitation	105%	114%	120%

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

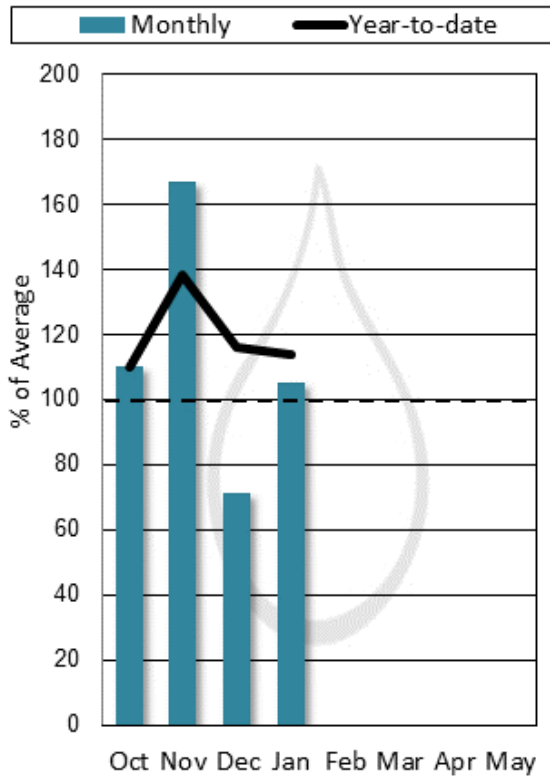
Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	101%	52%	103%

*See Reservoir Storage Table for storage in individual reservoirs

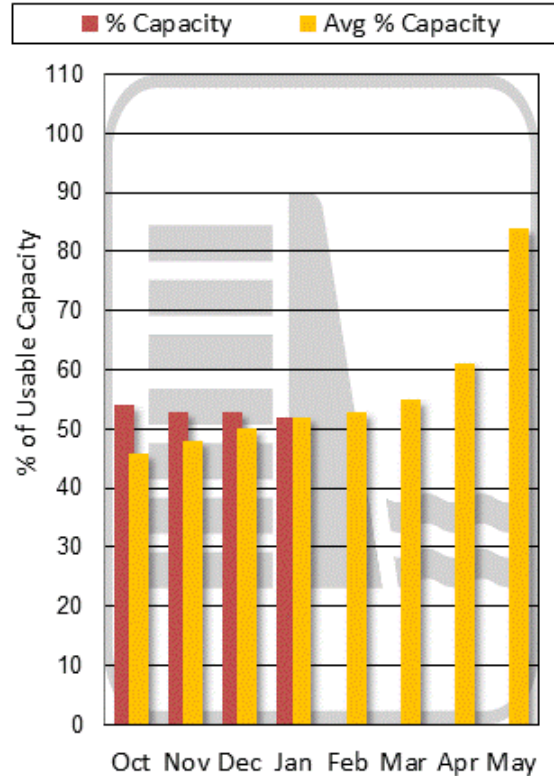
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley Precipitation

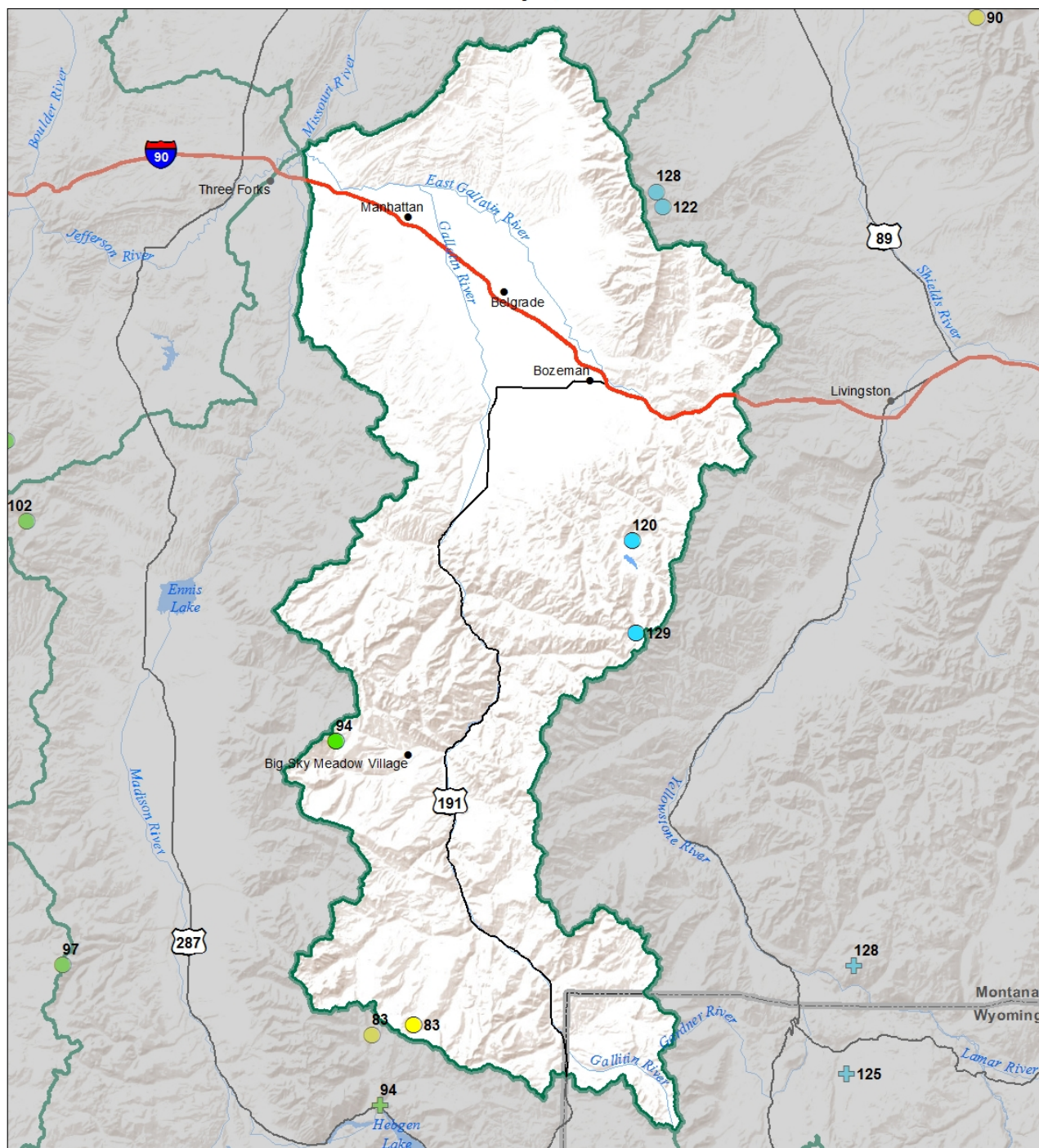


End of Month Reservoir Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

Gallatin River Basin Snow Water Equivalent Percentage of Normal February 1, 2019



Snow Water Equivalent Percent of Normal

SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

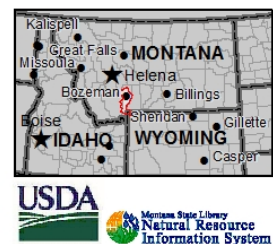
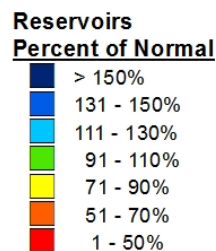
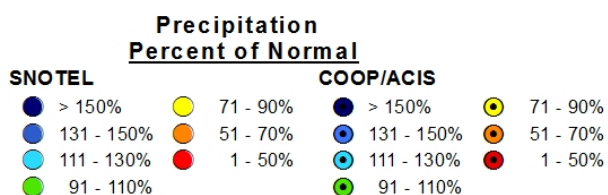
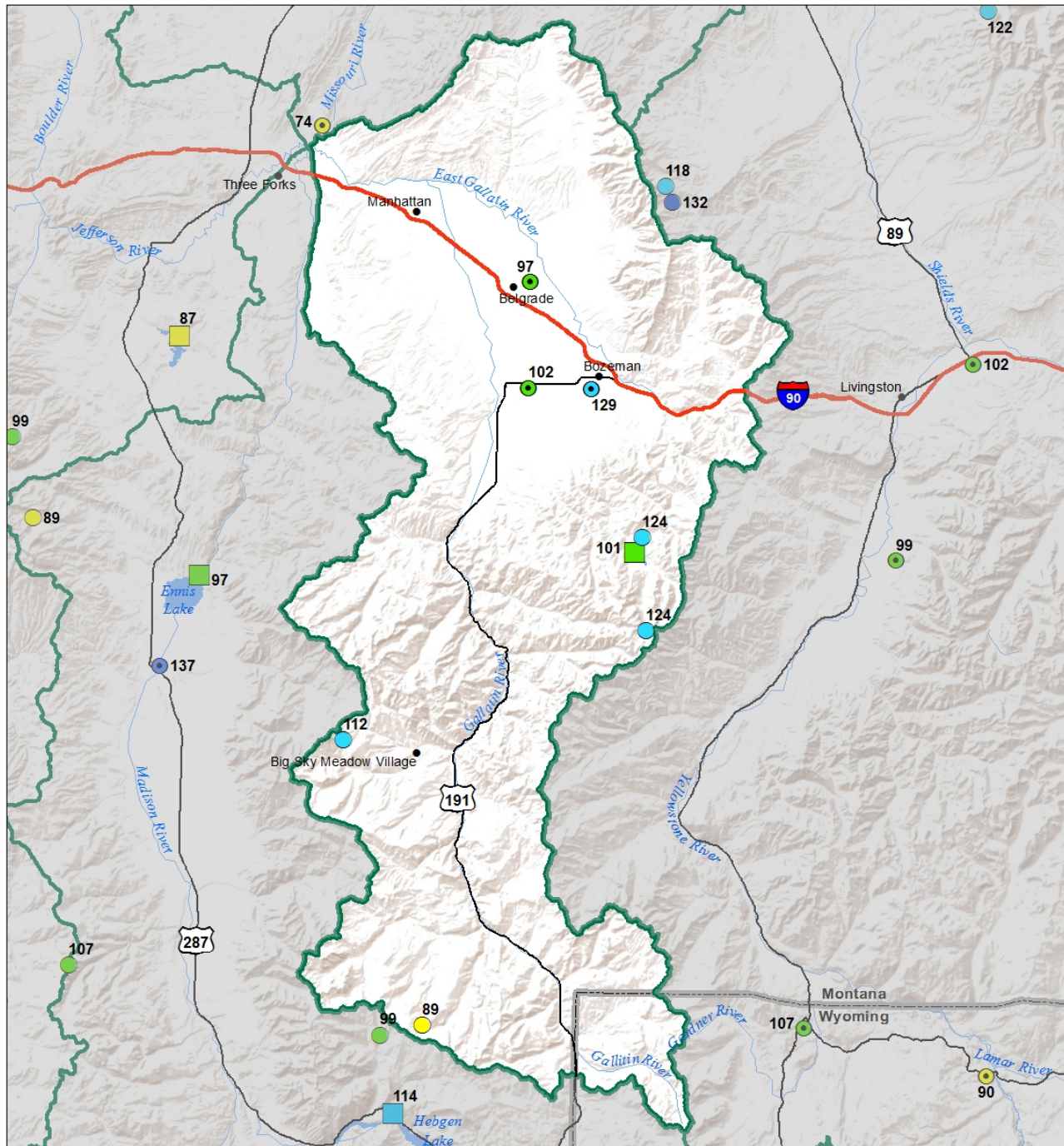
- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%

Snowcourse

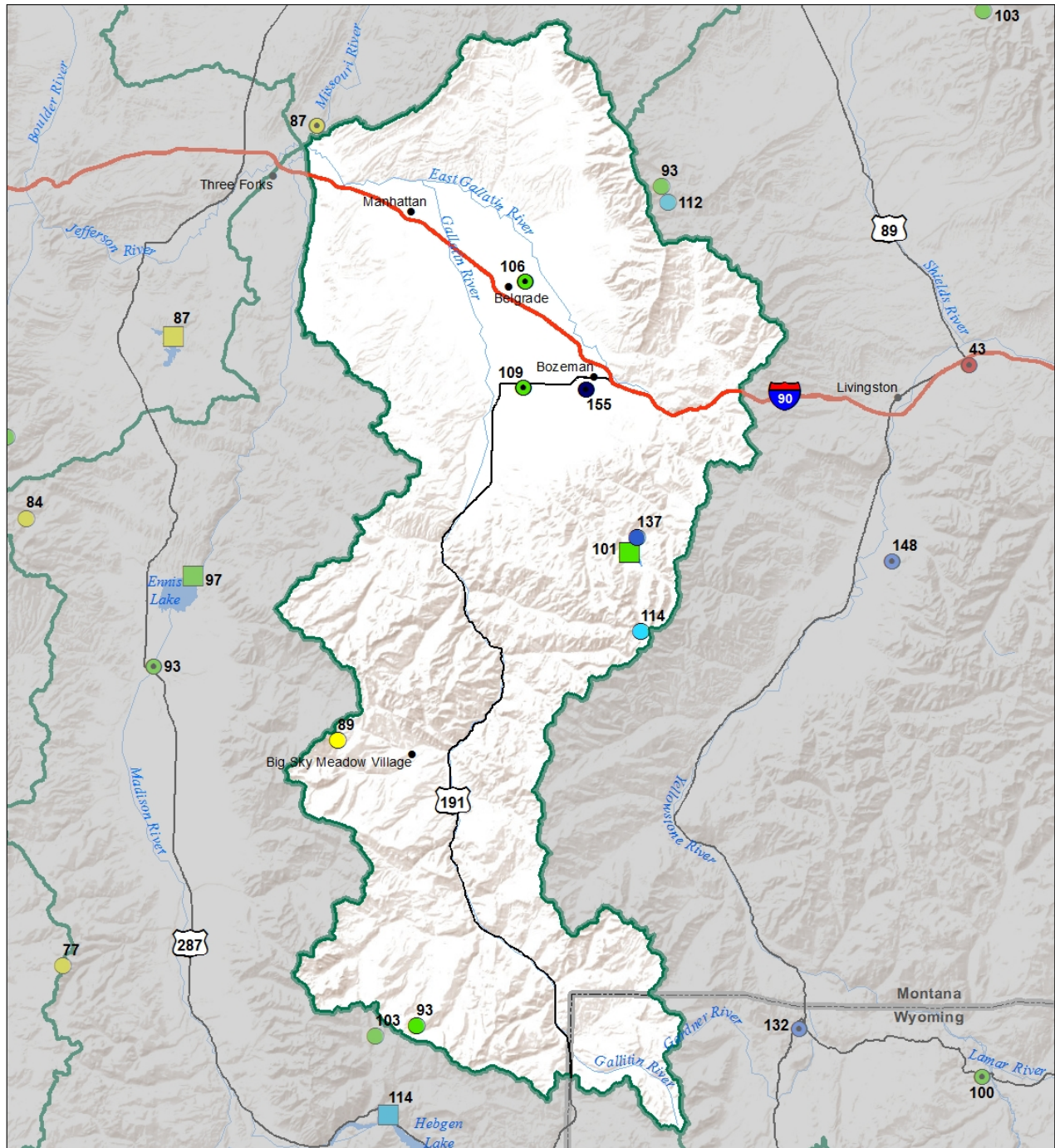
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%



Gallatin River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019



Gallatin River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019 (January 1, 2019 - February 1, 2019)



**Precipitation
Percent of Normal**

SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

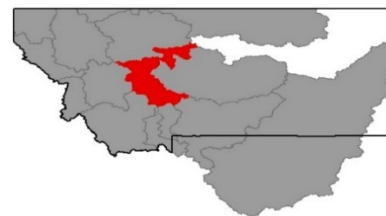
COOP/ACIS

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

**Reservoirs
Percent of Normal**

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%





Headwaters Mainstem (Missouri) River Basin

January isn't typically a big month in the mountains surrounding Helena and the Missouri River valley, but this year proved to be different. Snow trickled in during the first week of the month but was quickly followed by a period of high pressure and dry conditions. By mid-month, almost all mountain SNOTEL sites were below normal for the date, except for [Rocker Peak SNOTEL](#) which was benefitting from abundant November snowfall. The major storm systems that impacted the region from January 18th-28th added 1.7" to 2.3" of Snow Water Equivalent (SWE) to the snowpack which helped the snowpack totals to climb to above normal in the mountains south of Helena on Feb 1st. There was improvement from Jan 1st in the Big Belt Mountains and Nevada Mountains north towards Lincoln to slightly below normal due to the abundant late January snow. The gains over the month were very welcome in some regions. [Nevada Ridge SNOTEL](#) was the lowest on record (25 years) on Jan 1st but has improved to 86% of normal for this date. The mountains in this region have a relatively shallow snowpack compared to some of the other ranges of the state, which illustrates that one or two storm systems can quickly change snowpack percentages. Basin-wide snowpack totals for Feb 1st are slightly above normal for this date at 107%.

Headwaters Missouri Mainstem River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
HEADWATERS MAINSTEM	111%	148%
SMITH-JUDITH-MUSSELSHELL	101%	123%
SUN-TETON-MARIAS	82%	116%
MAINSTEM ab FT PECK RES	100%	125%
MILK RIVER BASIN	147%	113%
Basin-Wide Snowpack	101%	125%

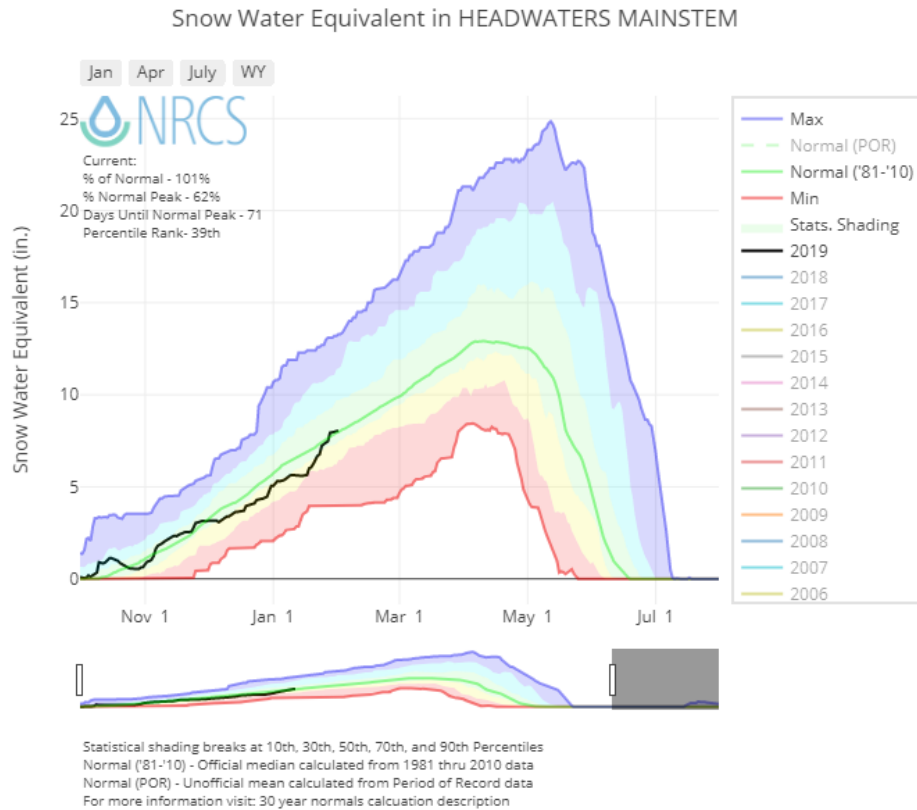
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	132%	105%	123%
Valley Precipitation	131%	72%	190%
Basin-Wide Precipitation	132%	103%	126%

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

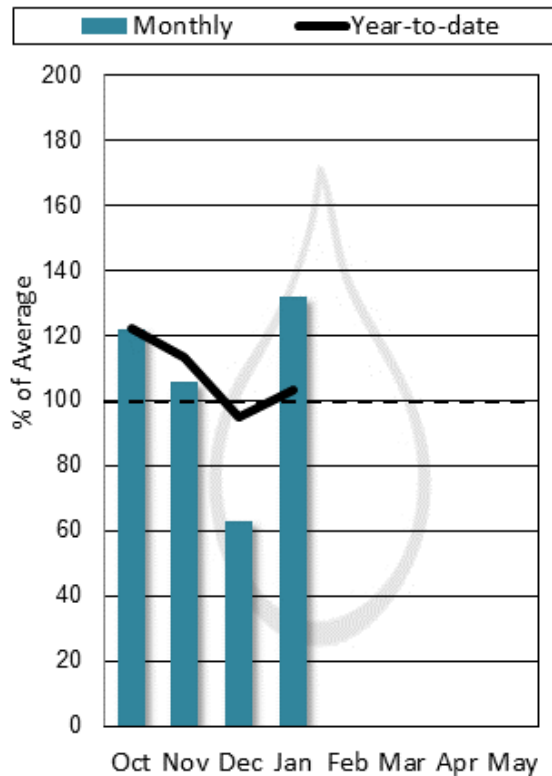
Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	117%	81%	115%

*See Reservoir Storage Table for storage in individual reservoirs

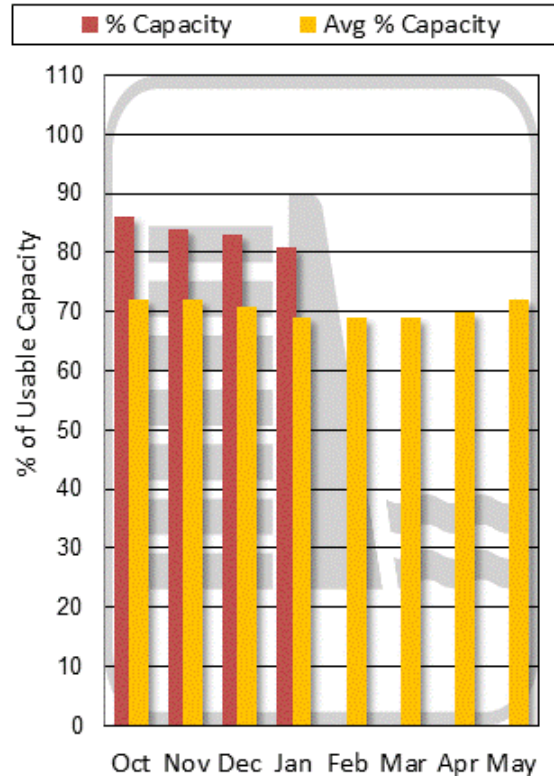
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley Precipitation

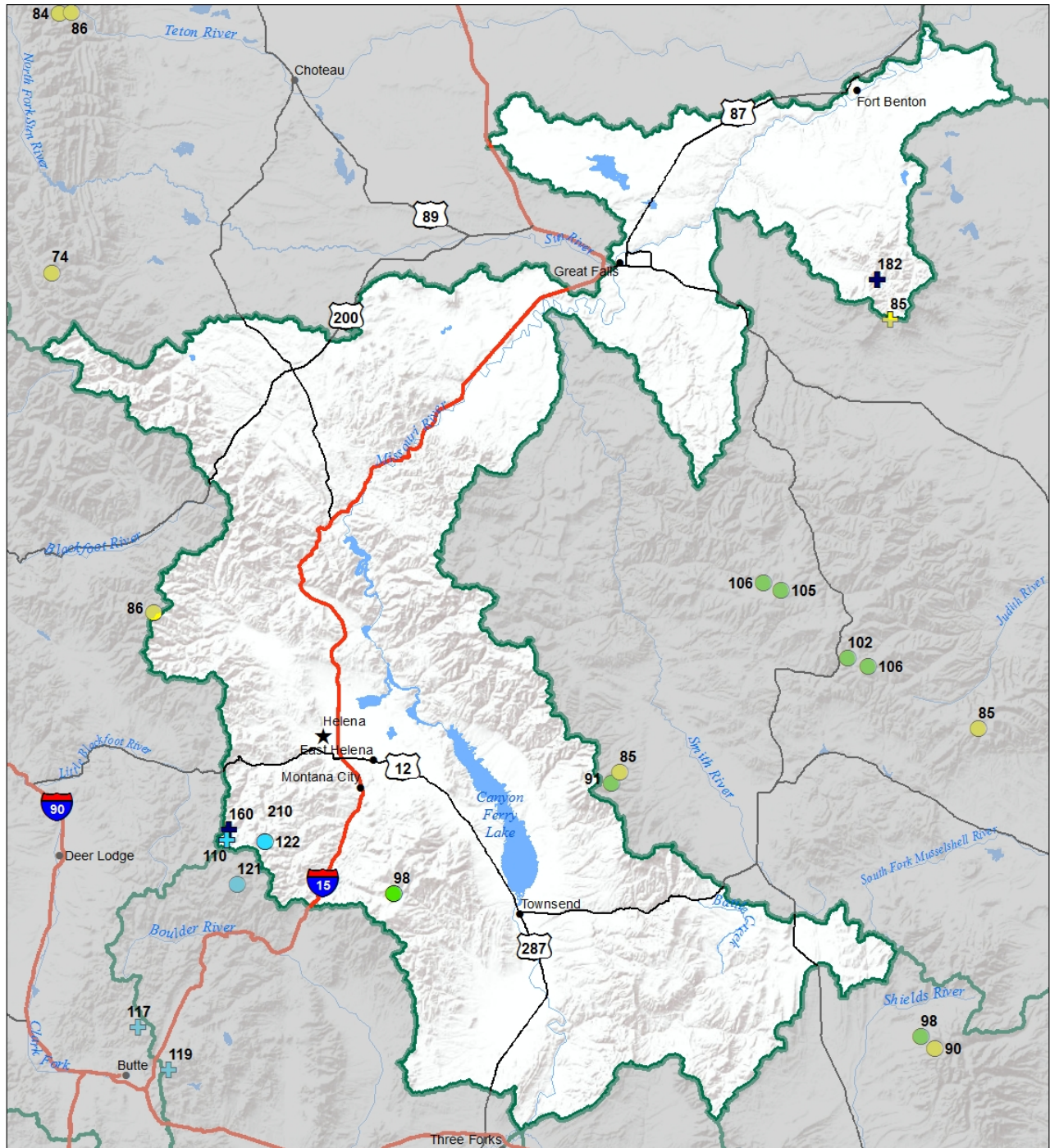


End of Month Reservoir Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

Headwaters Mainstem (Missouri) River Basin Snow Water Equivalent Percentage of Normal February 1, 2019



Snow Water Equivalent Percent of Normal

SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%

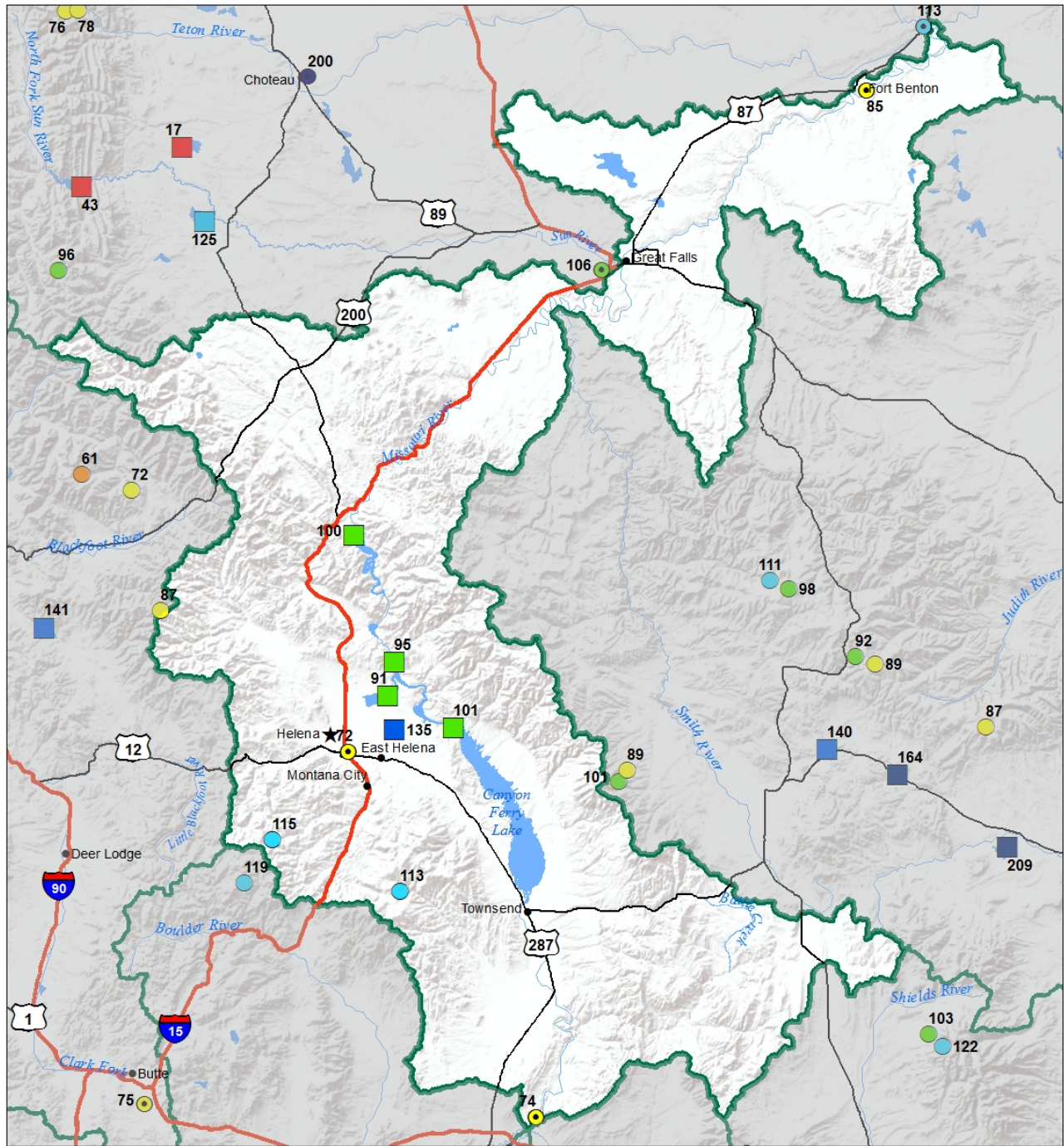
Snowcourse

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%



Headwaters Mainstem (Missouri) River Basin Water Year to Date Precipitation and Reservoir Levels Percentage of Normal February 1, 2019

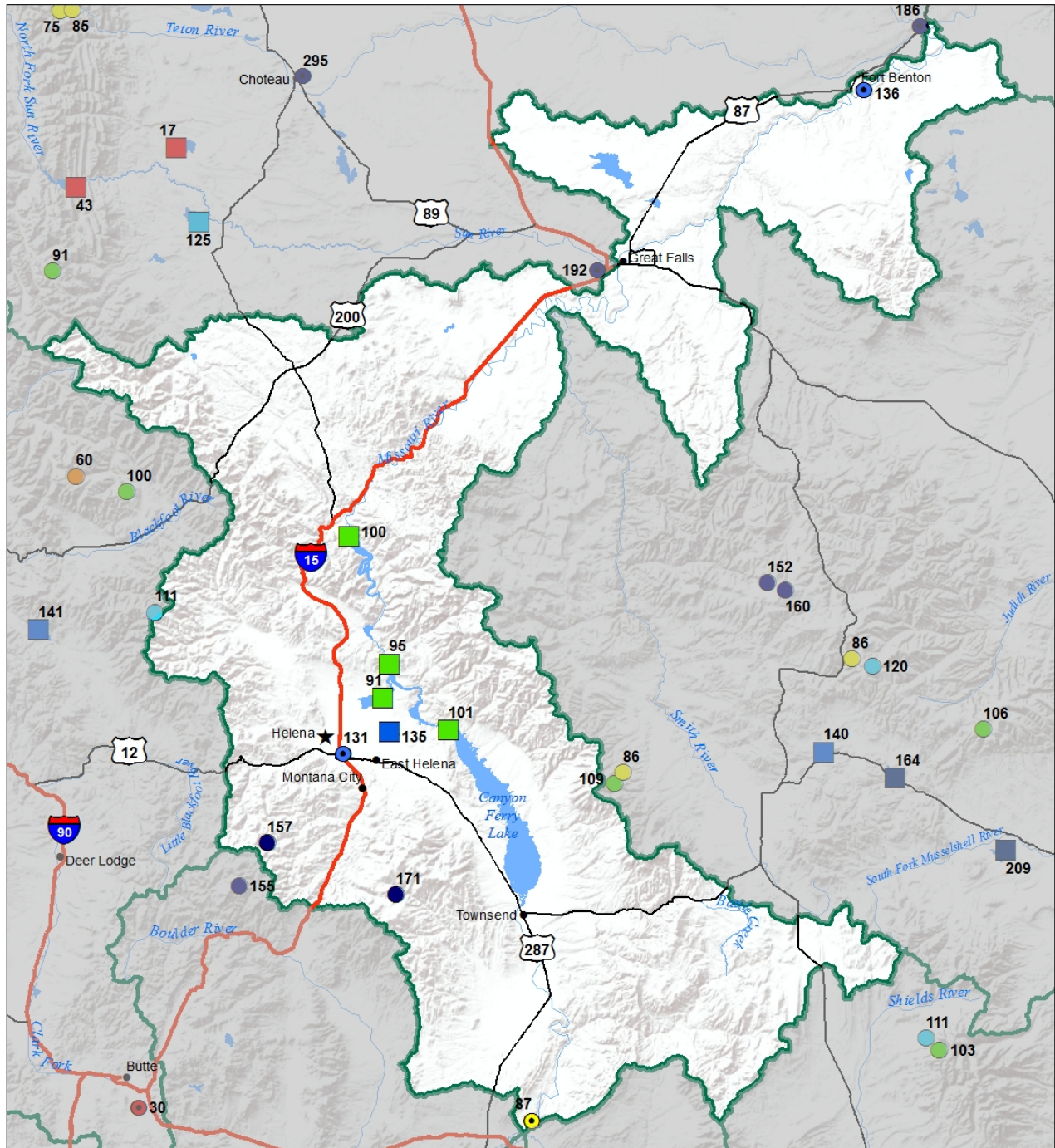


Precipitation Percent of Normal			
SNOTEL		COOP/ACIS	
● > 150%	● 71 - 90%	● > 150%	● 71 - 90%
● 131 - 150%	● 51 - 70%	● 131 - 150%	● 51 - 70%
● 111 - 130%	● 1 - 50%	● 111 - 130%	● 1 - 50%
● 91 - 110%		● 91 - 110%	

Reservoirs Percent of Normal	
■ > 150%	■ 131 - 150%
■ 111 - 130%	■ 91 - 110%
■ 71 - 90%	■ 51 - 70%
■ 1 - 50%	



Headwaters Mainstem (Missouri) River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019 (January 1, 2019 - February 1, 2019)



**Precipitation
Percent of Normal**

SNOTEL

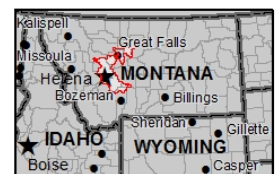
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

COOP/ACIS

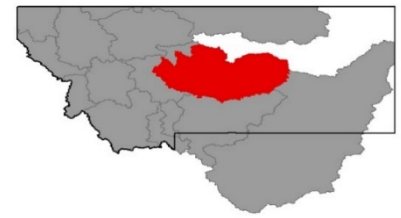
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

**Reservoirs
Percent of Normal**

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%



Smith-Judith-Musselshell River Basin



Snowpack totals in the Smith-Judith-Musselshell River are in good shape on Feb 1st, in the Little Belt and Castle Mountains where snowpack was low on Jan 1st there was improvement from late January storms. Cold northwest flow from Canada combined with moisture from the Pacific added 2.0" to 4.8" of Snow Water Equivalent (SWE) to the snowpack during the course of January, which is 113% to 150% of the typical monthly totals. The above average snowfall has resulted in basin-wide snowpack that is 101% of normal for February 1st and ranks 3rd amongst basin-wide snowpack in the state. Only the Big Belt Range has snowpack which is below normal for this time, but with the typically wet spring months these deficits can be overcome. Reservoir storage is critical to water users in this region and the additional good news is that storage continues to be well above average for Feb 1st. If this coming spring takes a turn for the worse this should provide some insulation should snowpack totals take a dive before runoff, but spring precipitation in the region is critical to water users and producers in the region. It would be unwise to take the good news from this month and assume that we're set for runoff this year. The story is almost always what happens during the spring in this region, but for now things are on the right track.

Smith Judith Musselshell River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
SMITH	99%	120%
HIGHWOOD	125%	51%
JUDITH	106%	120%
MUSSELSHELL	90%	153%
Basin-Wide Snowpack	101%	123%

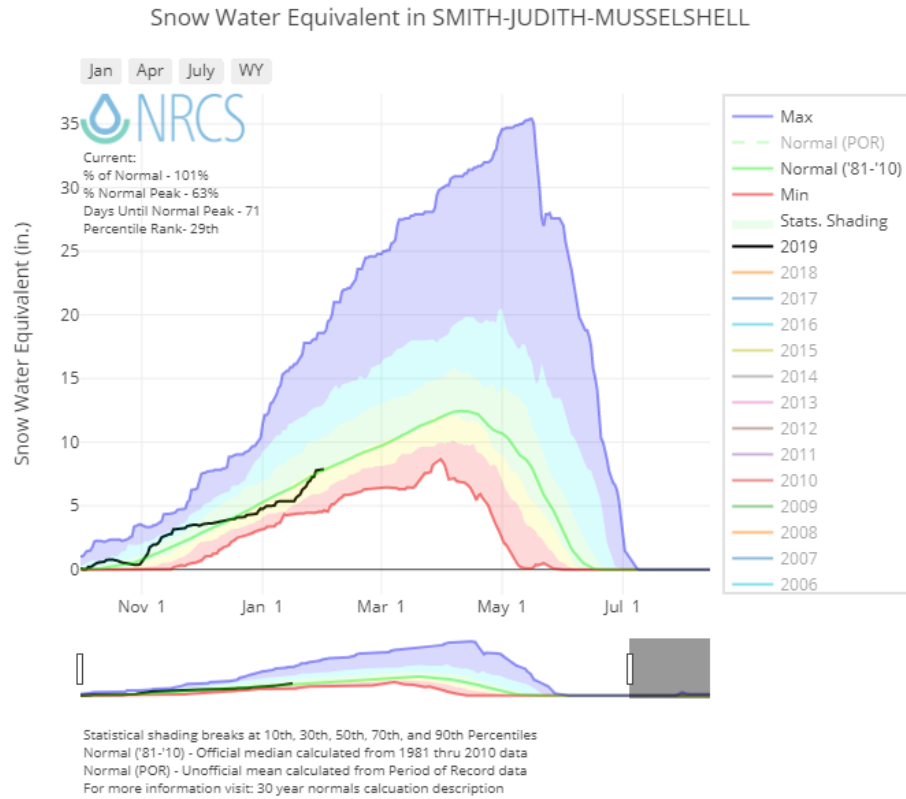
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	119%	100%	108%
Valley Precipitation	61%	98%	122%
Basin-Wide Precipitation	115%	100%	109%

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

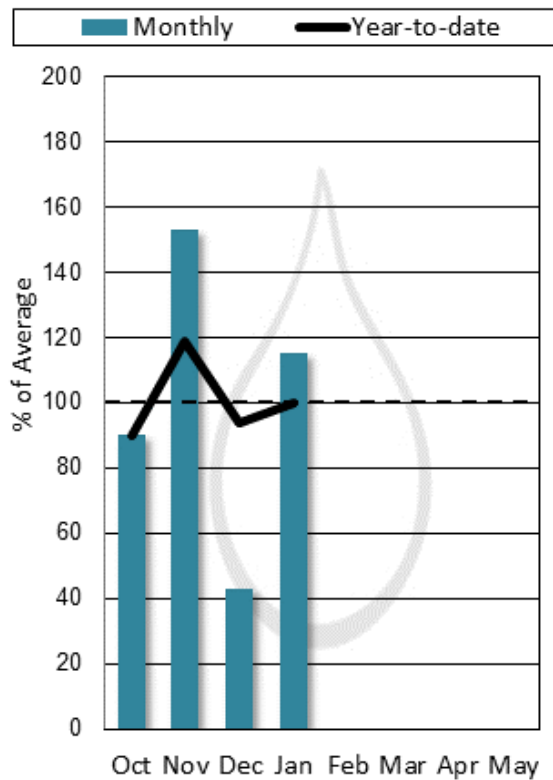
Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	164%	89%	135%

*See Reservoir Storage Table for storage in individual reservoirs

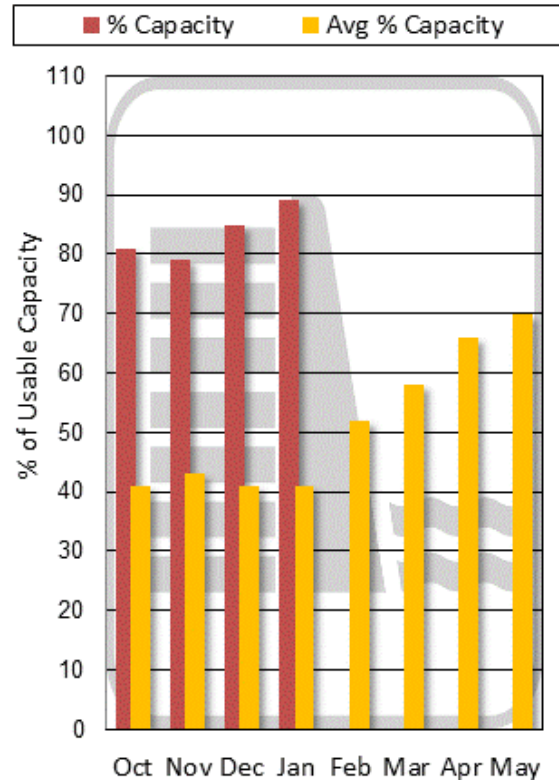
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley Precipitation

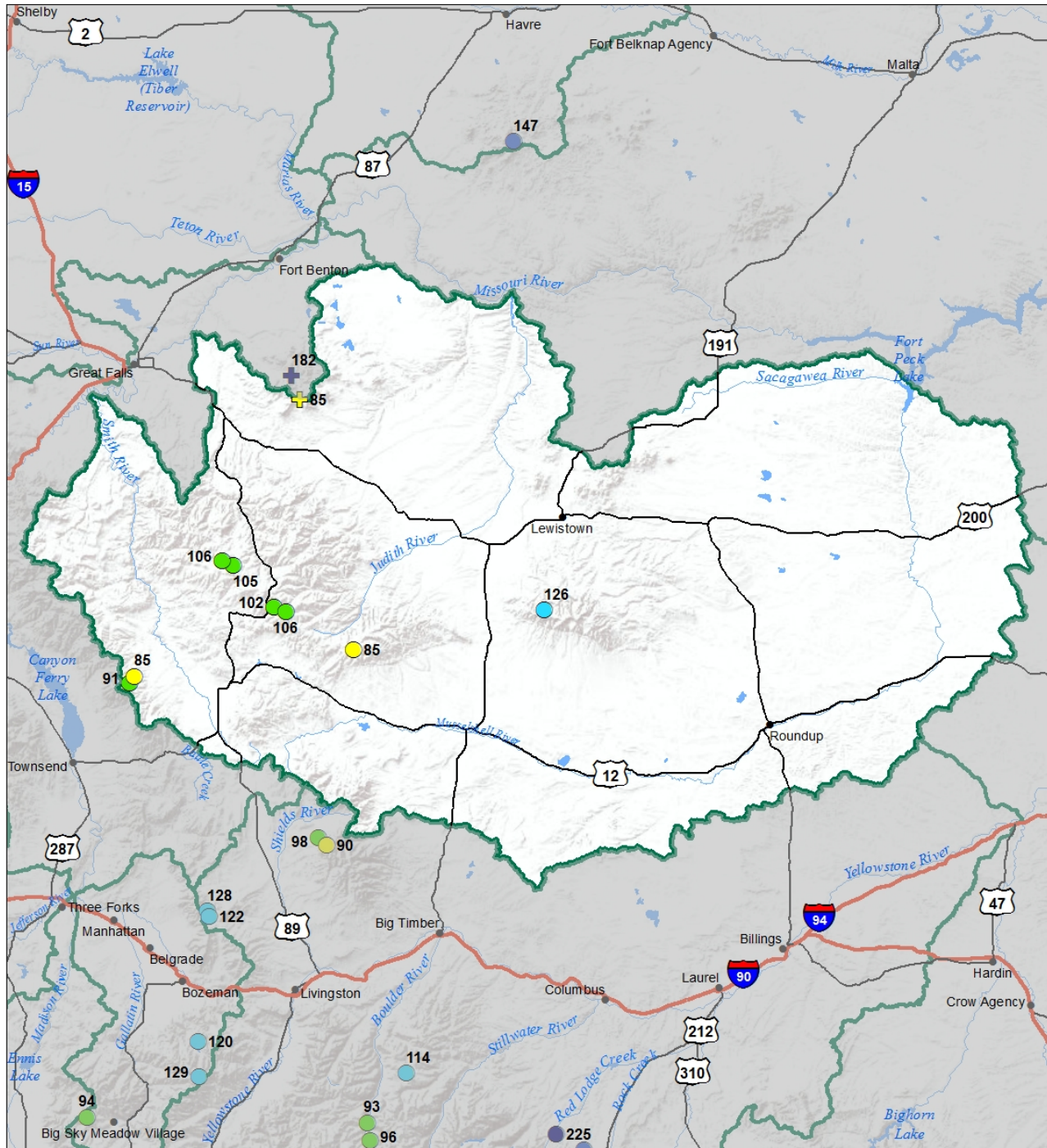


End of Month Reservoir Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

**Smith-Judith-Musselshell River Basin
Snow Water Equivalent
Percentage of Normal
February 1, 2019**



**Snow Water Equivalent
Percent of Normal**

SNOTEL

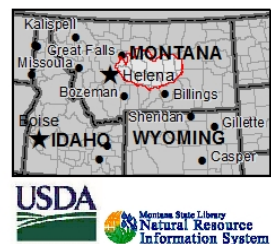
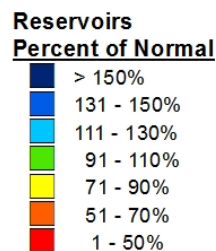
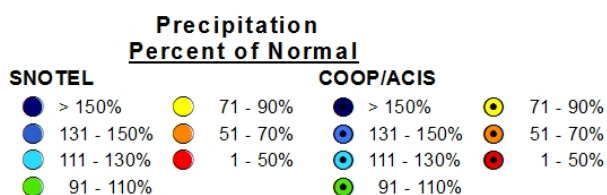
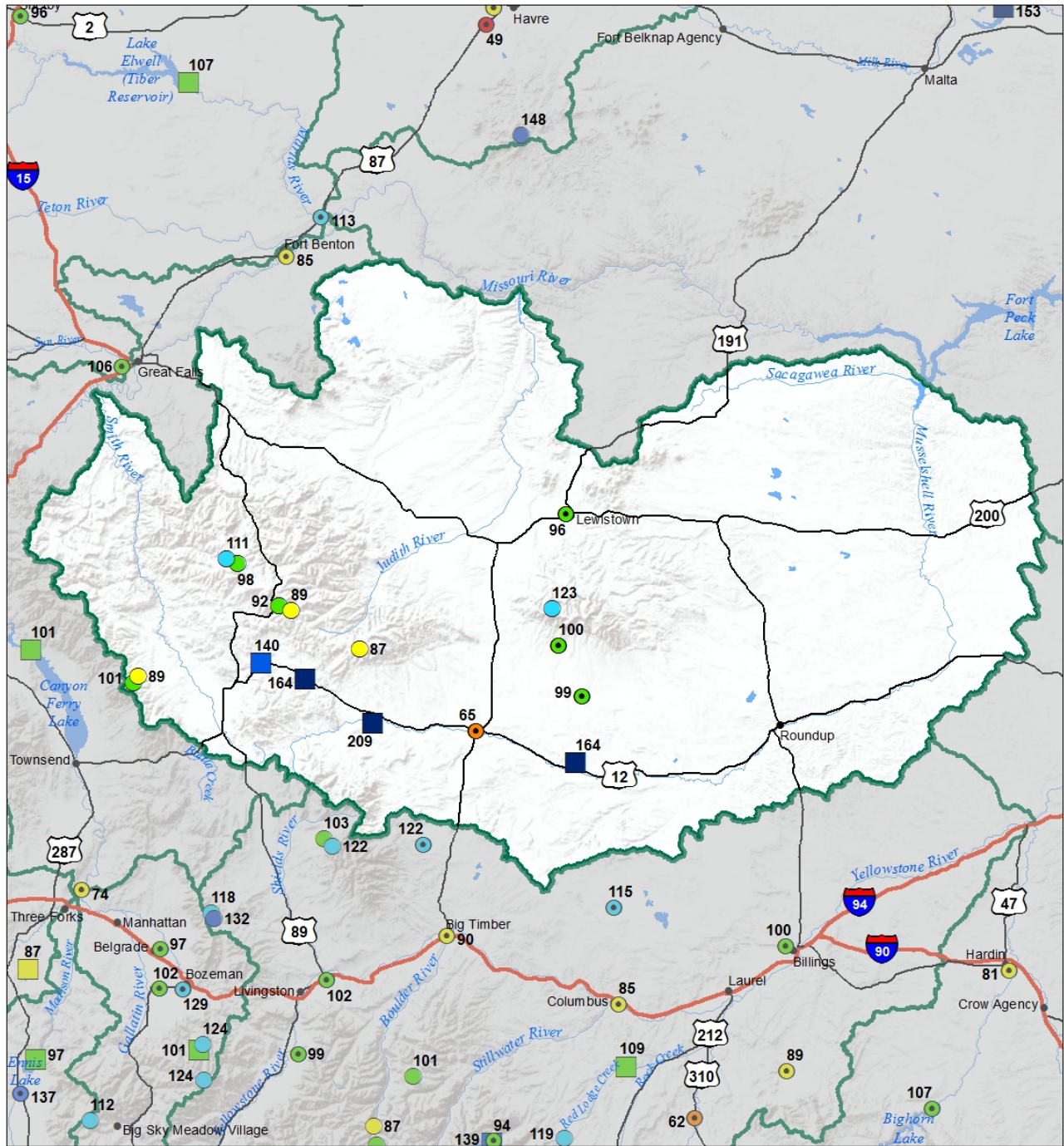
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%

Snowcourse

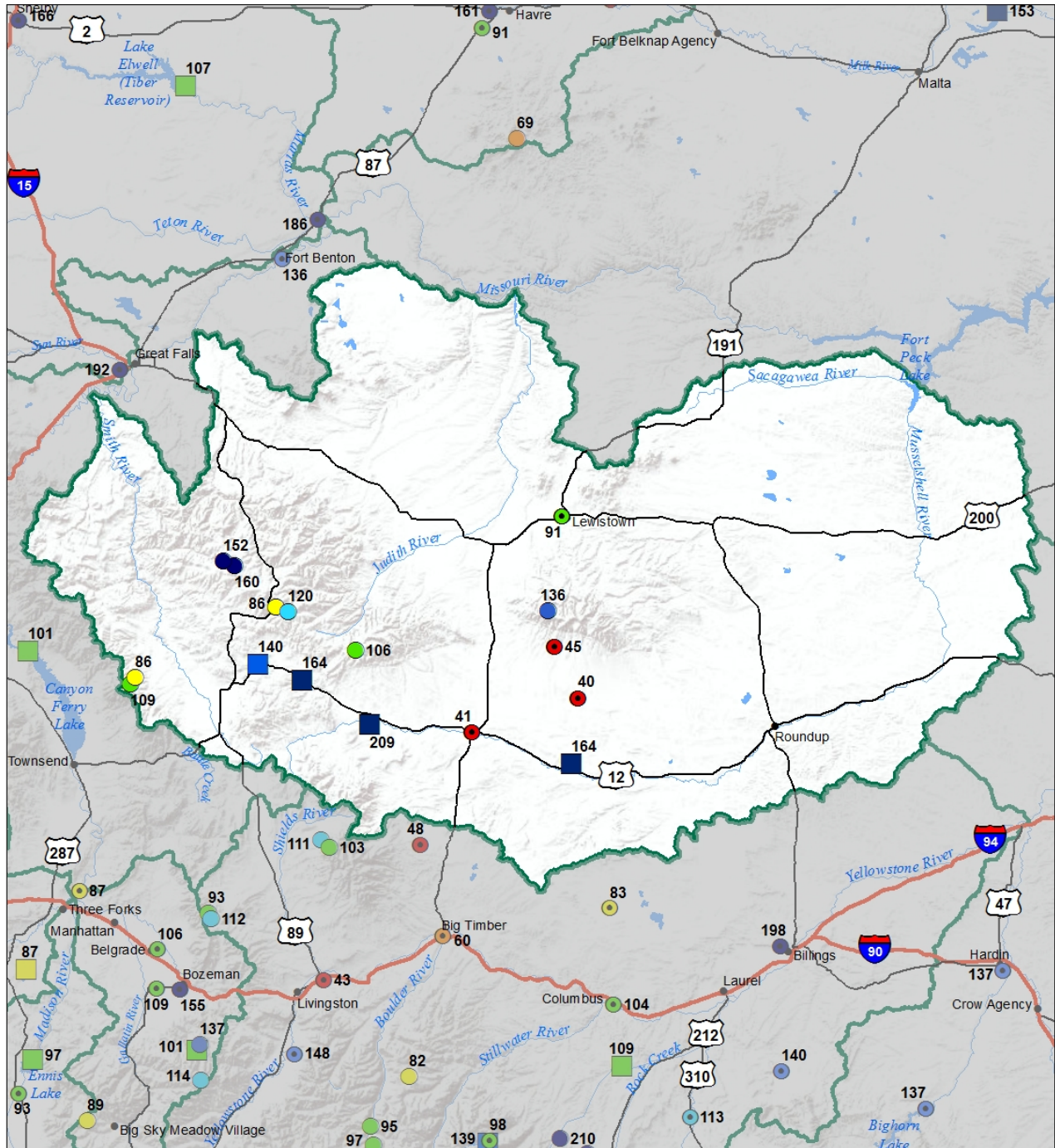
- ✚ > 150%
- ✚ 131 - 150%
- ✚ 111 - 130%
- ✚ 91 - 110%
- ✚ 71 - 90%
- ✚ 51 - 70%
- ✚ 1 - 50%
- ✚ 0%



Smith-Judith-Musselshell River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019



Smith-Judith-Musselshell River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019 (January 1, 2019 - February 1, 2019)



**Precipitation
Percent of Normal**

SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

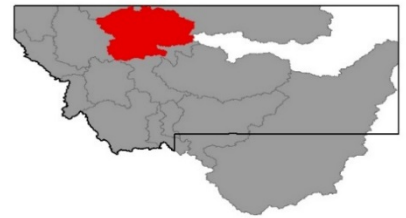
COOP/ACIS

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

**Reservoirs
Percent of Normal**

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%





Sun-Teton-Marias River Basin

Storms finally arrived shortly after the first of January in the Sun-Teton-Marias River basin, which were building on a shallow and below average snowpack in the region. The main event during the month of January was the storm system that impacted the region from January 17th- 28th which blanketed the mountains with 20 to 30 inches of snow, adding 1.6" to 3.3" of Snow Water Equivalent (SWE) to the snowpack. Snowpack totals on February 1st range from 74% to 88% of normal, up from last month, and basin-wide snowpack is 82% of normal. Badger Pass SNOTEL, which was reinstalled this past September was the biggest winner with regards to snowfall during January, and although it received 5.6" of SWE, this was only 80% of the normal amount of snow for the month. Other sites in the region received 76% to 125% of normal snow accumulation. The disturbance from the Strawberry fire may be to blame for this discrepancy, [as the change at the site due to fire](#) may be causing snow to accumulate or be blown from the site. The NRCS Snow Survey Staff will continue to monitor the site to gauge this change and may discontinue the use of a "normal" to calculate percentages for the site and basin-wide totals in the future. It is great to see some improvement in the basin over the last month, but spring will be critical in determining water supply this spring and summer as May and June are typically the "wettest" months of the year.

Sun-Teton-Marias River Basin Data Summary

Snowpack

	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
SUN	81%	118%
TETON	86%	116%
MARIAS	81%	114%
Basin-Wide Snowpack	82%	116%

Precipitation

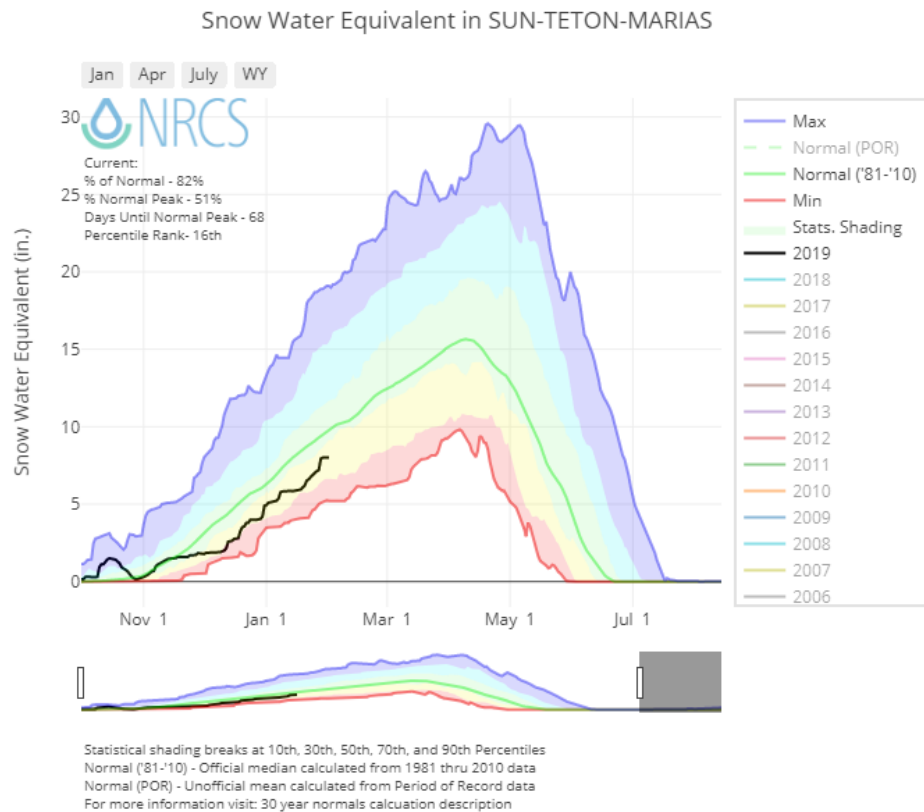
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	84%	84%	119%
Valley Precipitation	253%	171%	200%
Basin-Wide Precipitation	92%	89%	124%

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

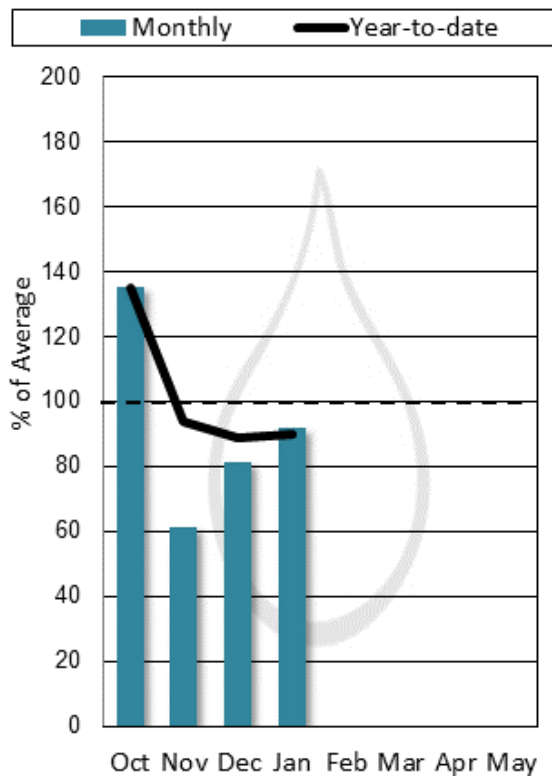
Reservoir Storage

	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	105%	54%	100%

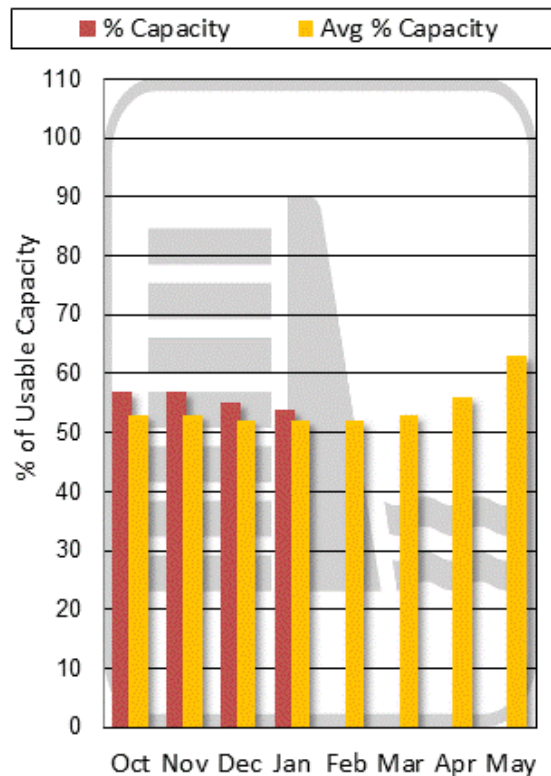
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley Precipitation

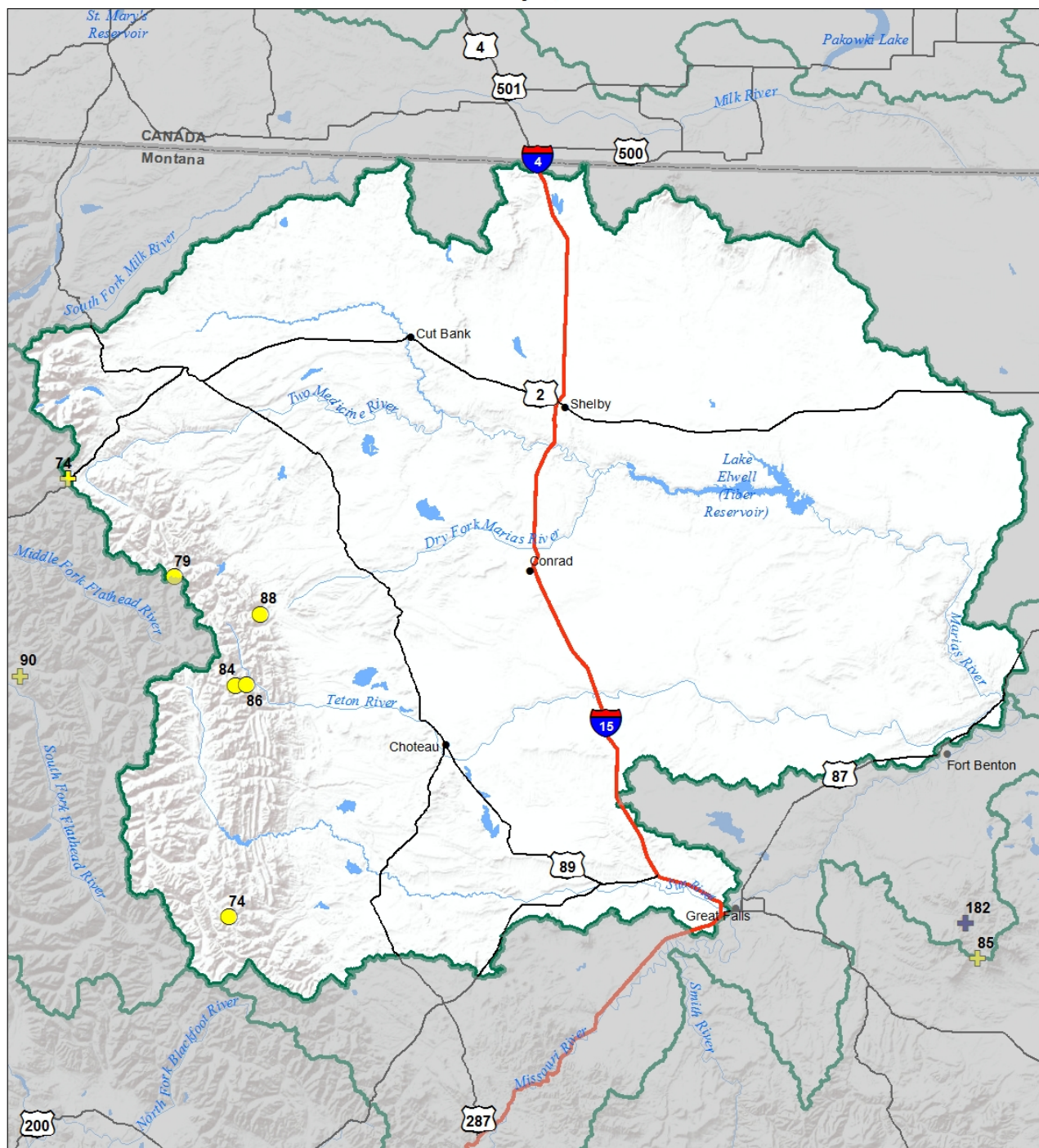


End of Month Reservoir Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

**Sun-Teton-Marias River Basin
Snow Water Equivalent
Percentage of Normal
February 1, 2019**



**Snow Water Equivalent
Percent of Normal**

SNOTEL

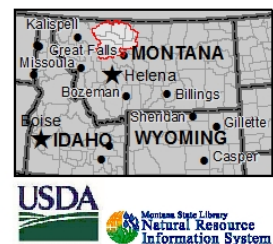
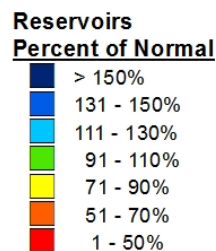
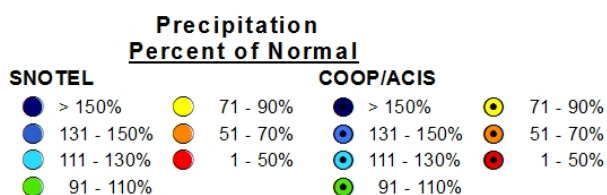
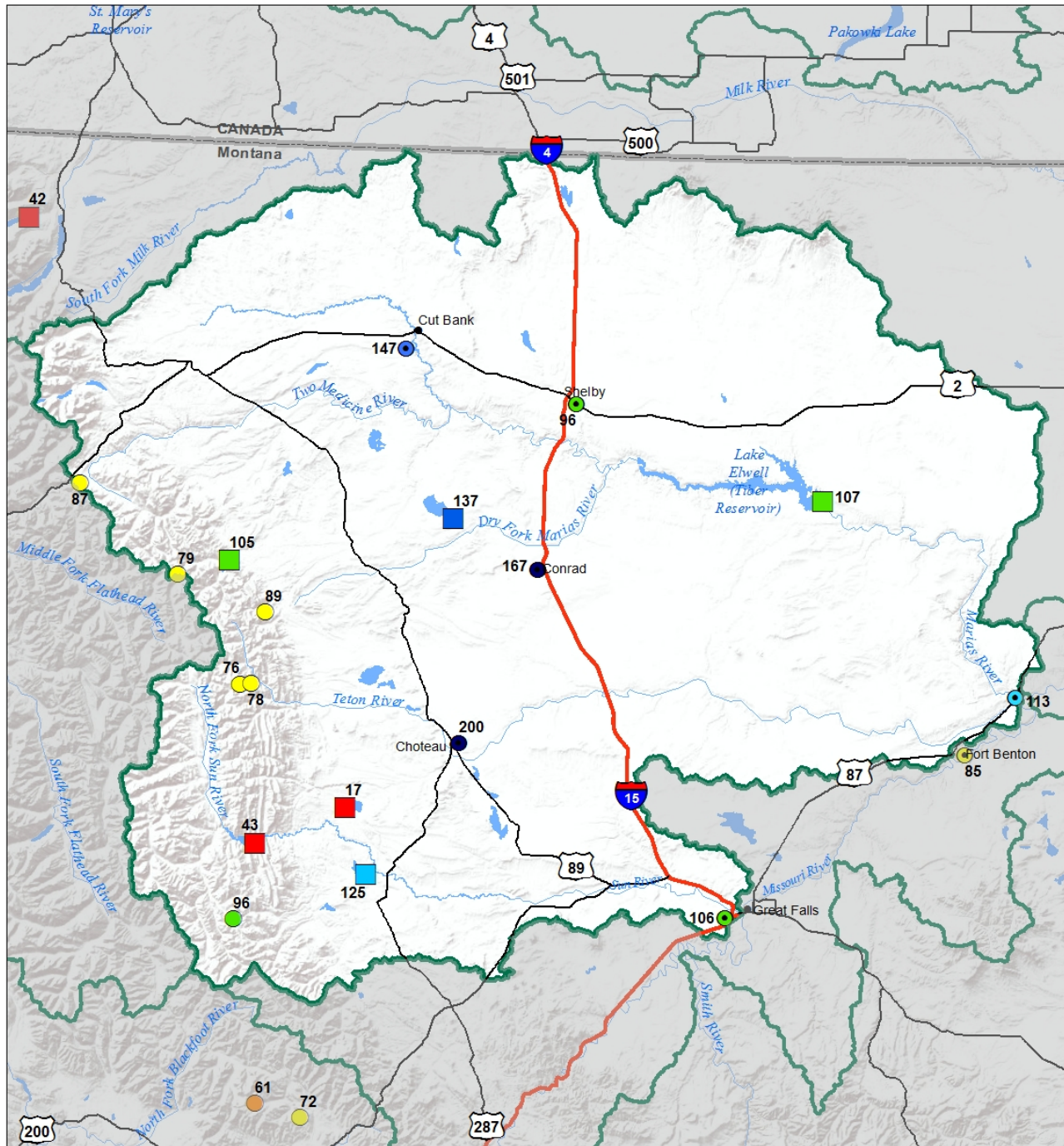
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%

Snowcourse

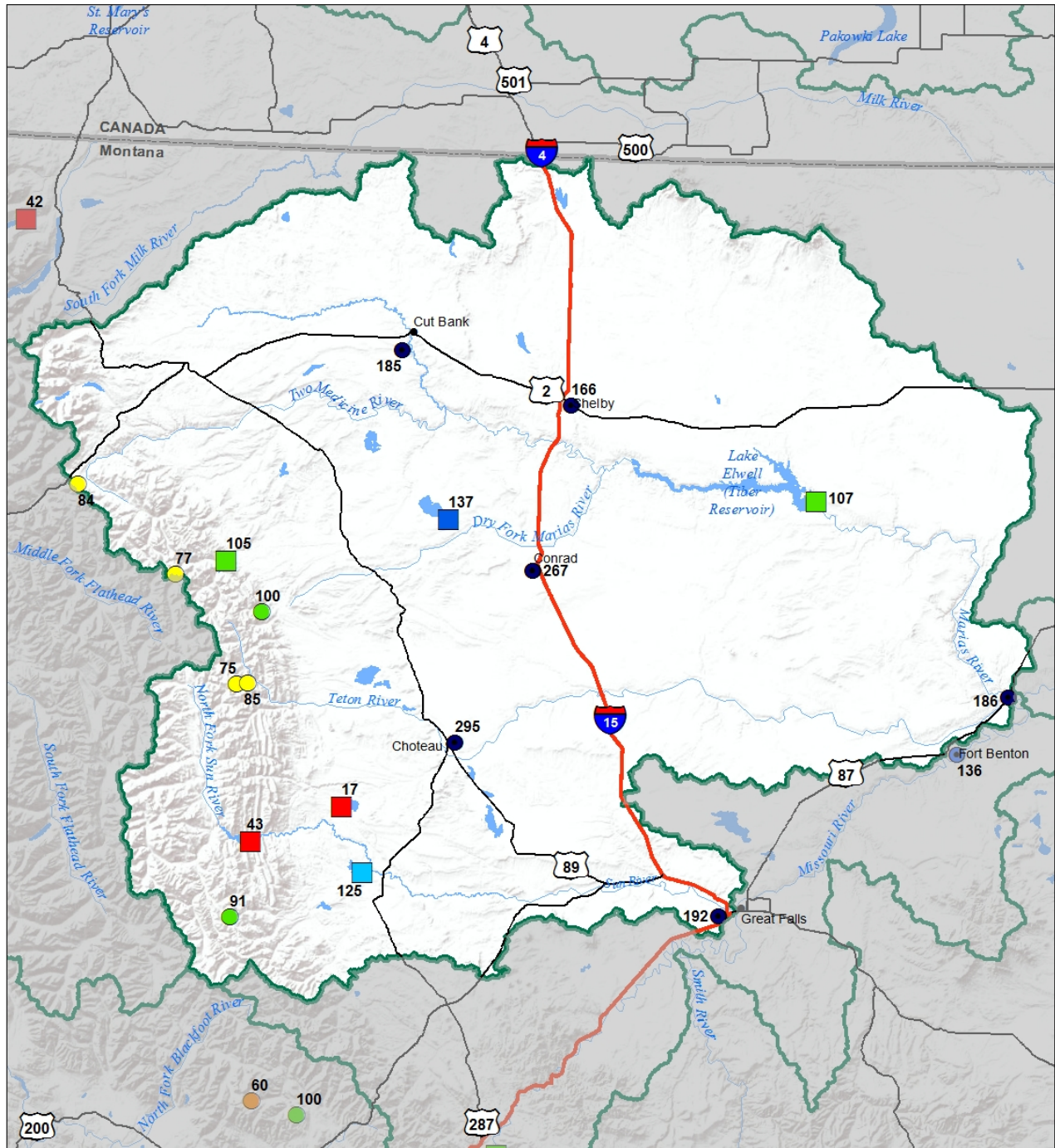
- ⊕ > 150%
- ⊕ 131 - 150%
- ⊕ 111 - 130%
- ⊕ 91 - 110%
- ⊕ 71 - 90%
- ⊕ 51 - 70%
- ⊕ 1 - 50%
- ⊕ 0%



Sun-Teton-Marias River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019



Sun-Teton-Marias River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019 (January 1, 2019 - February 1, 2019)



**Precipitation
Percent of Normal**

SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

COOP/ACIS

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

**Reservoirs
Percent of Normal**

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%



St. Mary-Milk River Basin



Snowpack in the mountains feeding the St. Mary River in Montana remains below normal on Feb 1st, but the high elevation Flattop SNOTEL site did experience some improvement during the month of January. Storms favored the higher elevation terrain in Glacier National Park during the month, and lower elevation locations experienced a small decrease in snowpack percentages. Overall snowpack totals in the St. Mary basin are 81% of normal for February 1st.

Further east in the Milk River basin, monthly precipitation was above average in many valley locations for the month of January, and snow totals in the Bearpaw mountains were normal for the month. Snowpack at the Rocky Boy SNOTEL site is currently 144% of normal for February 1st.

St. Mary-Milk River Basin Data Summary

Snowpack

	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
ST. MARY	81%	100%
BEARPAW MOUNTAINS	147%	113%
CYPRESS HILLS, CANADA	%	%
MILK RIVER BASIN	147%	113%
Basin-Wide	86%	101%

Precipitation

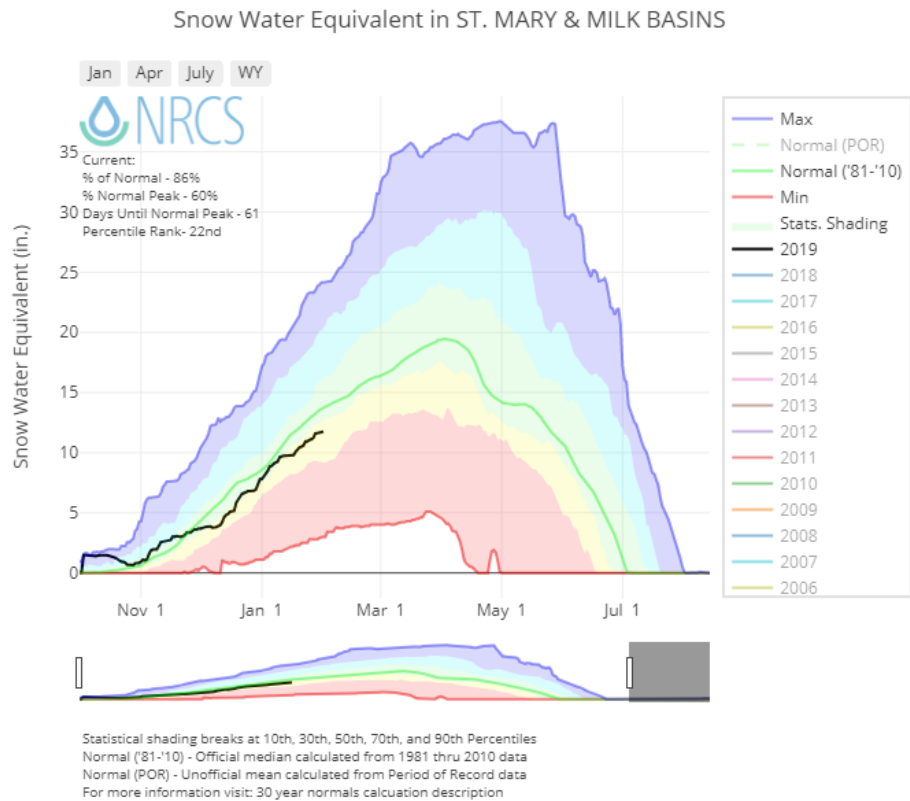
	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation (St. Mary)	70%	80%	112%
Mountain Precipitation (Bearpaw Mtns)	69%	148%	167%
Valley Precipitation	77%	81%	120%
Basin-Wide Precipitation	70%	87%	119%

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

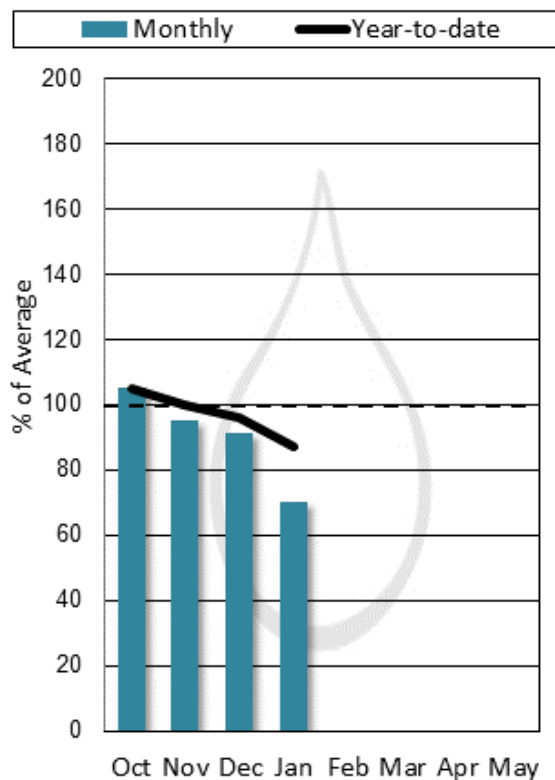
Reservoir Storage

	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	99%	39%	94%

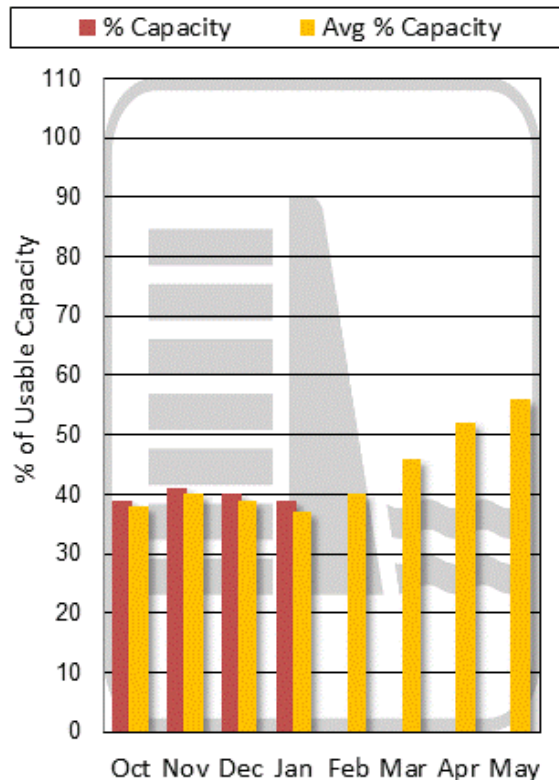
(click on chart below to navigate to [online version](#) with additional features)



Mountain and Valley Precipitation

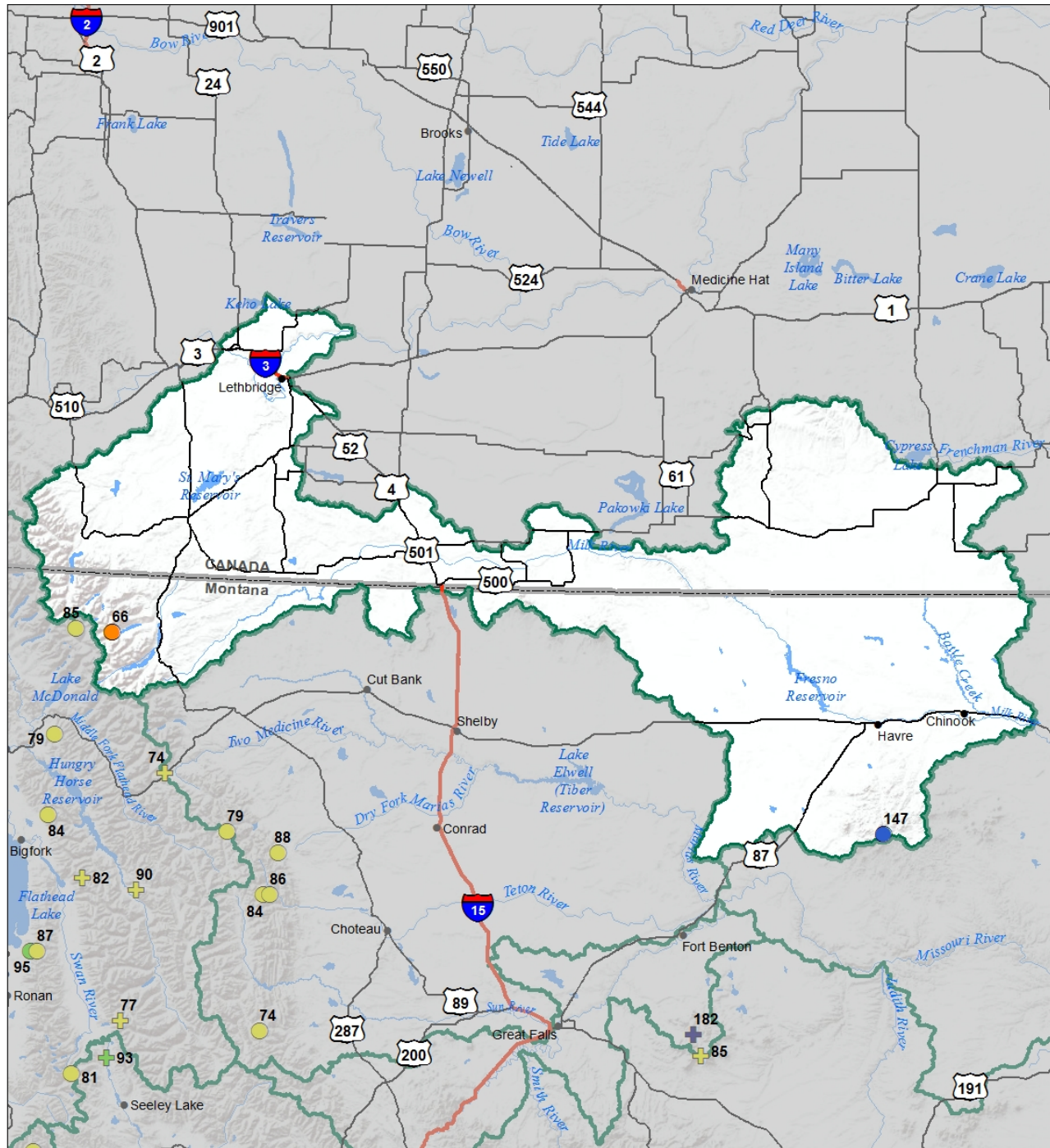


End of Month Reservoir Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

**St Mary's-Milk River Basin
Snow Water Equivalent
Percentage of Normal
February 1, 2019**



**Snow Water Equivalent
Percent of Normal**

SNOTEL

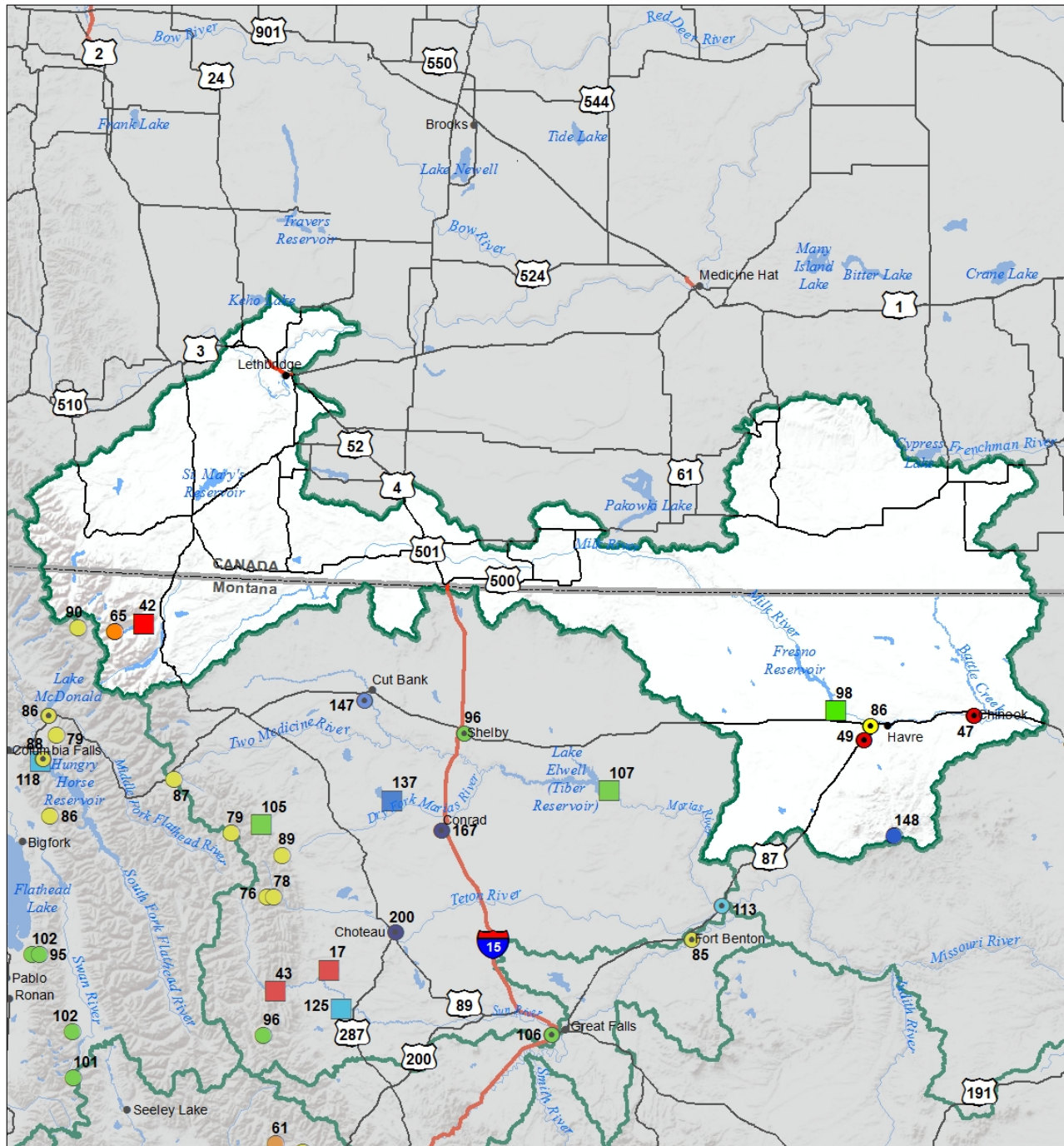
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%

Snowcourse

- ✚ > 150%
- ✚ 131 - 150%
- ✚ 111 - 130%
- ✚ 91 - 110%
- ✚ 71 - 90%
- ✚ 51 - 70%
- ✚ 1 - 50%
- ✚ 0%



St Mary's-Milk River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019



Precipitation
Percent of Normal

SNOTEL

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

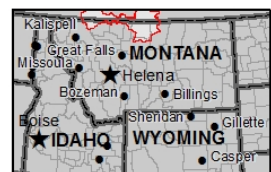
- 71 - 90%
- 51 - 70%
- 1 - 50%

COOP/ACIS

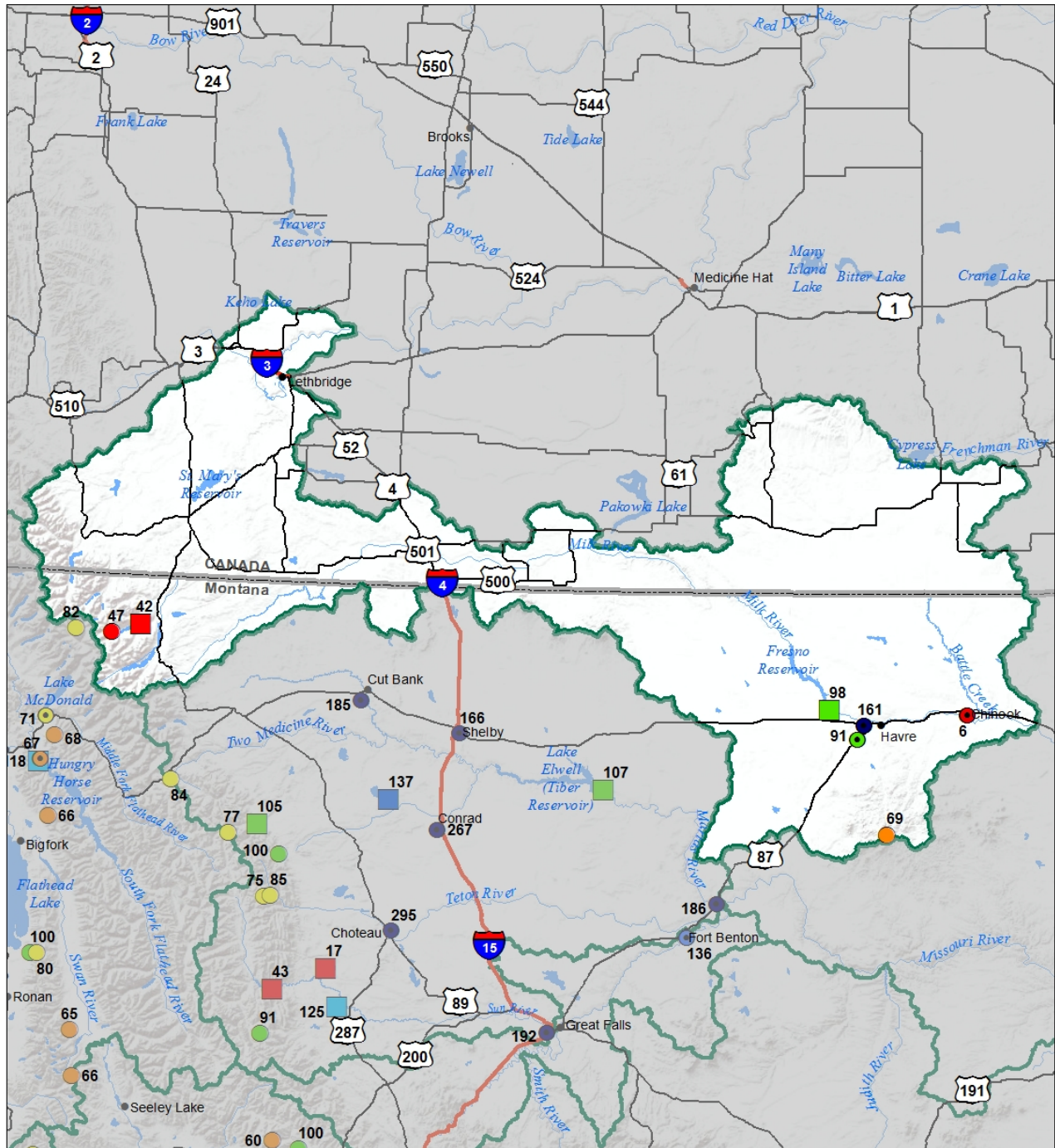
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%

Reservoirs
Percent of Normal

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%



St Mary's-Milk River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019 (January 1, 2019 - February 1, 2019)



**Precipitation
Percent of Normal**

SNOTEL

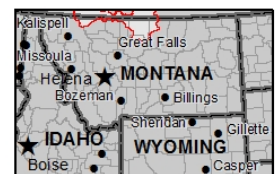
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

COOP/ACIS

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%

**Reservoirs
Percent of Normal**

- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%





Upper Yellowstone River Basin

Above normal snowfall during the month of January in many locations across the Upper Yellowstone River basin has resulted in basin-wide snowpack totals which are slightly above normal for February 1st. However, a look at the a few sub-basins across the greater Yellowstone shows some discrepancies where snow totals are below normal. Snowpack totals for January were 57% to 76% of normal in the Cooke City area and mountains feeding the Clark's Fork River, and 54% to 103% elsewhere in the Yellowstone National Park. Snowpack totals are lowest in the Cooke City area where mid and high elevation snowpack ranges from 71% to 77% of normal on February 1st. While these areas did benefit from the abundant late January snowfall the deficits experienced so far this winter and in early January were too much to overcome. Fortunately, the northern river basins have fared better throughout the winter and as you move north into the Boulder, Shields, and Stillwater River basins monthly snow totals were above normal for January. This built on an existing snowpack that was slightly below to near normal in some areas on Jan 1st, and now stands near to above normal in these basins. Based on long- term climate trends we typically see a dip in snowfall during the month of February in this region, but last year proved that anything can happen. For now, most of the greater river basin is off to a good start snowpack wise and spring precipitation can make up for the deficits we have in some of the sub-basins.

Upper Yellowstone River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
<i>YELLOWSTONE ab LIVINGSTON</i>	93%	145%
<i>SHIELDS</i>	113%	147%
<i>BOULDER-STILLWATER</i>	102%	157%
<i>RED LODGE-ROCK CREEK</i>	156%	124%
<i>CLARK'S FORK</i>	83%	162%
Basin-Wide Snowpack	98%	148%

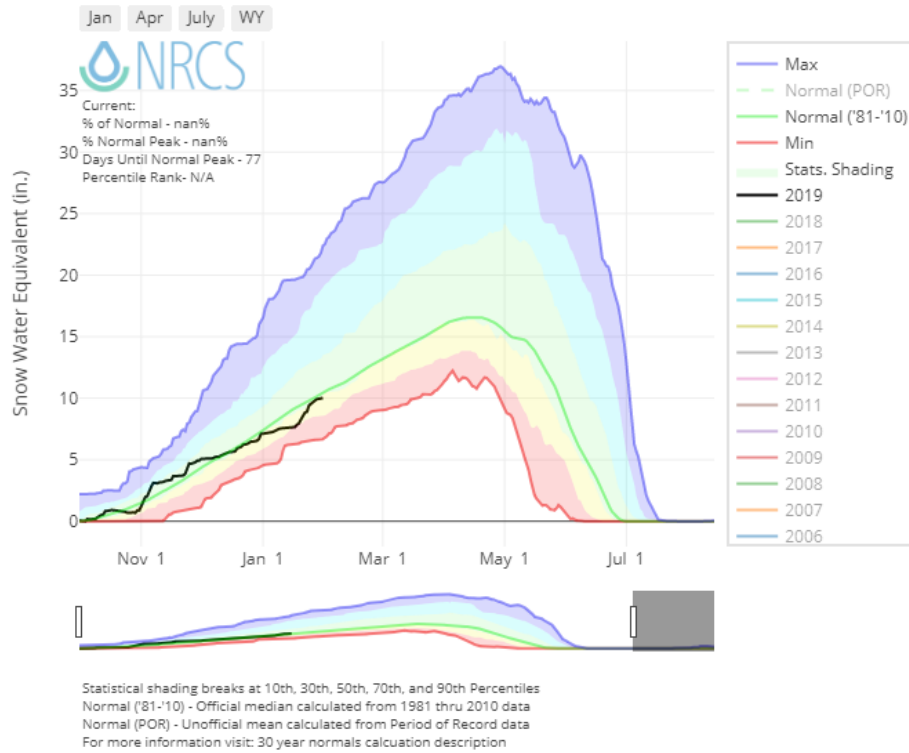
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	90%	100%	131%
Valley Precipitation	114%	103%	159%
Basin-Wide Precipitation	92%	100%	133%

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

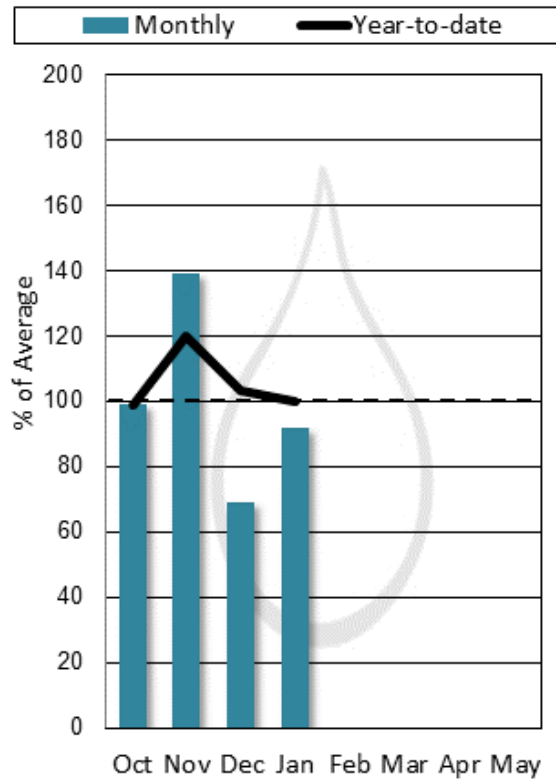
Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	116%	54%	129%

(click on chart below to navigate to [online version](#) with additional features)

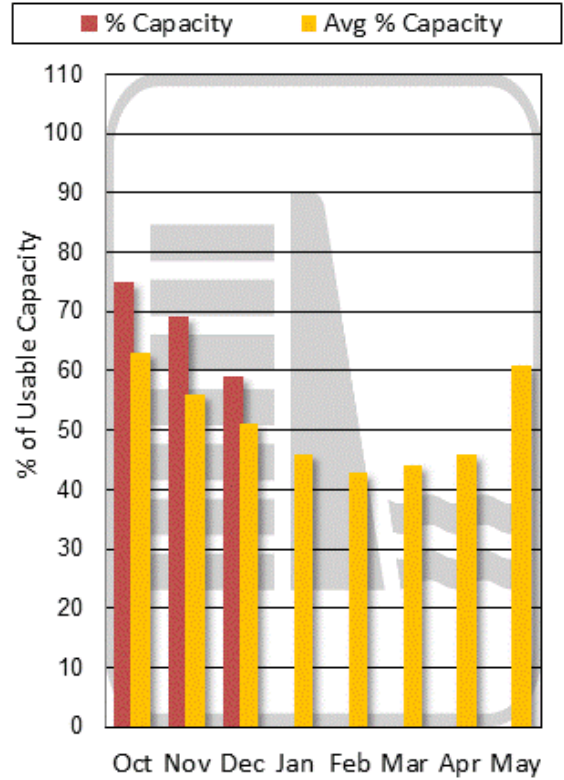
Snow Water Equivalent in UPPER YELLOWSTONE RIVER BASIN



Mountain and Valley Precipitation

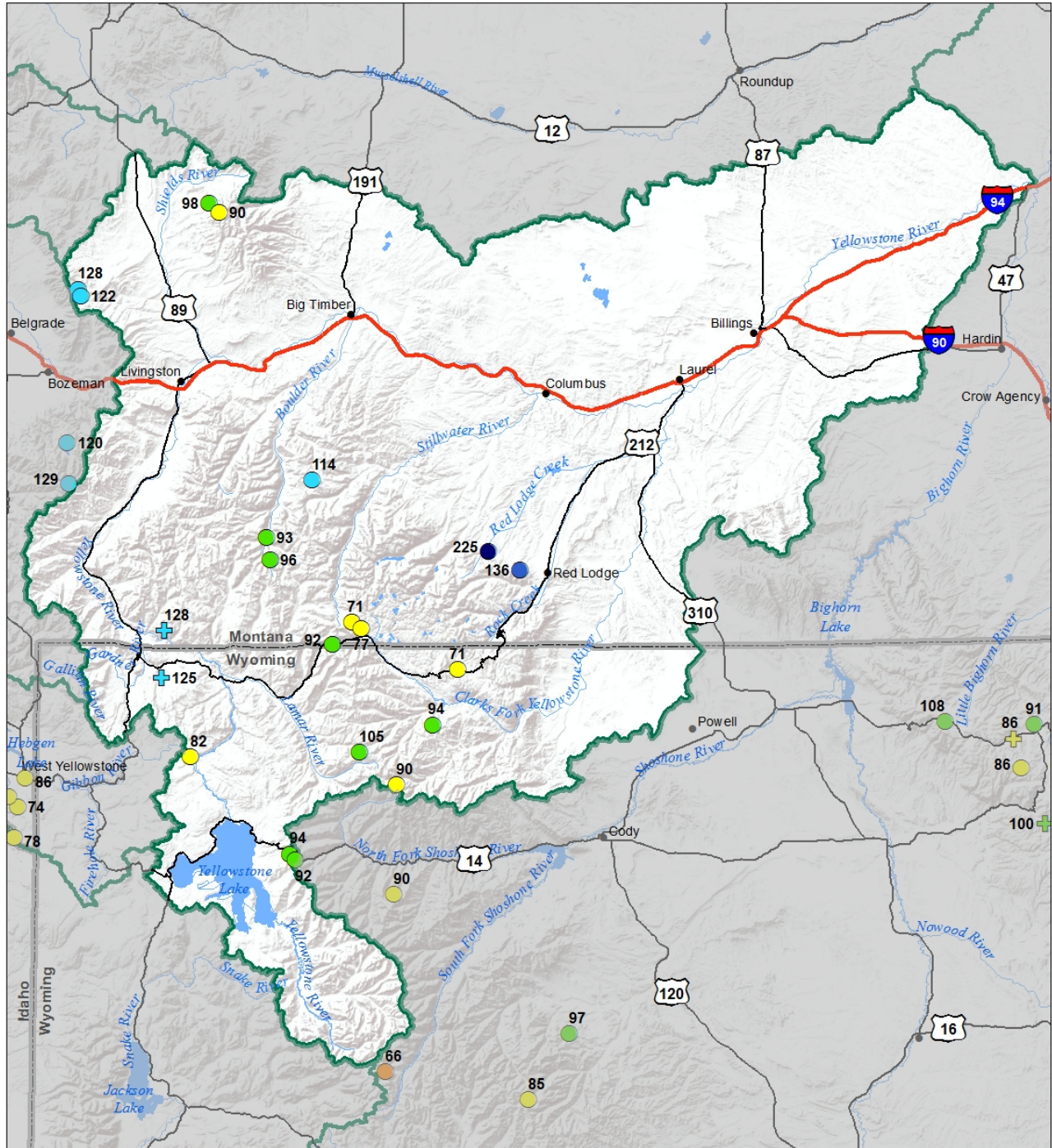


End of Month Reservoir Storage



Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

Upper Yellowstone River Basin
Snow Water Equivalent
Percentage of Normal
February 1, 2019



**Snow Water Equivalent
Percent of Normal**

SNOTEL

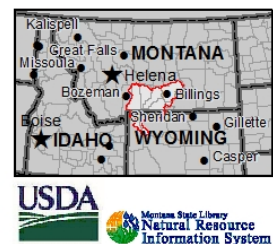
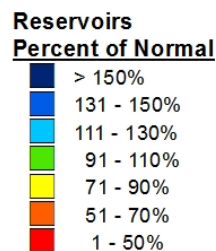
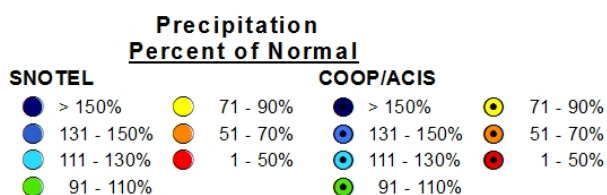
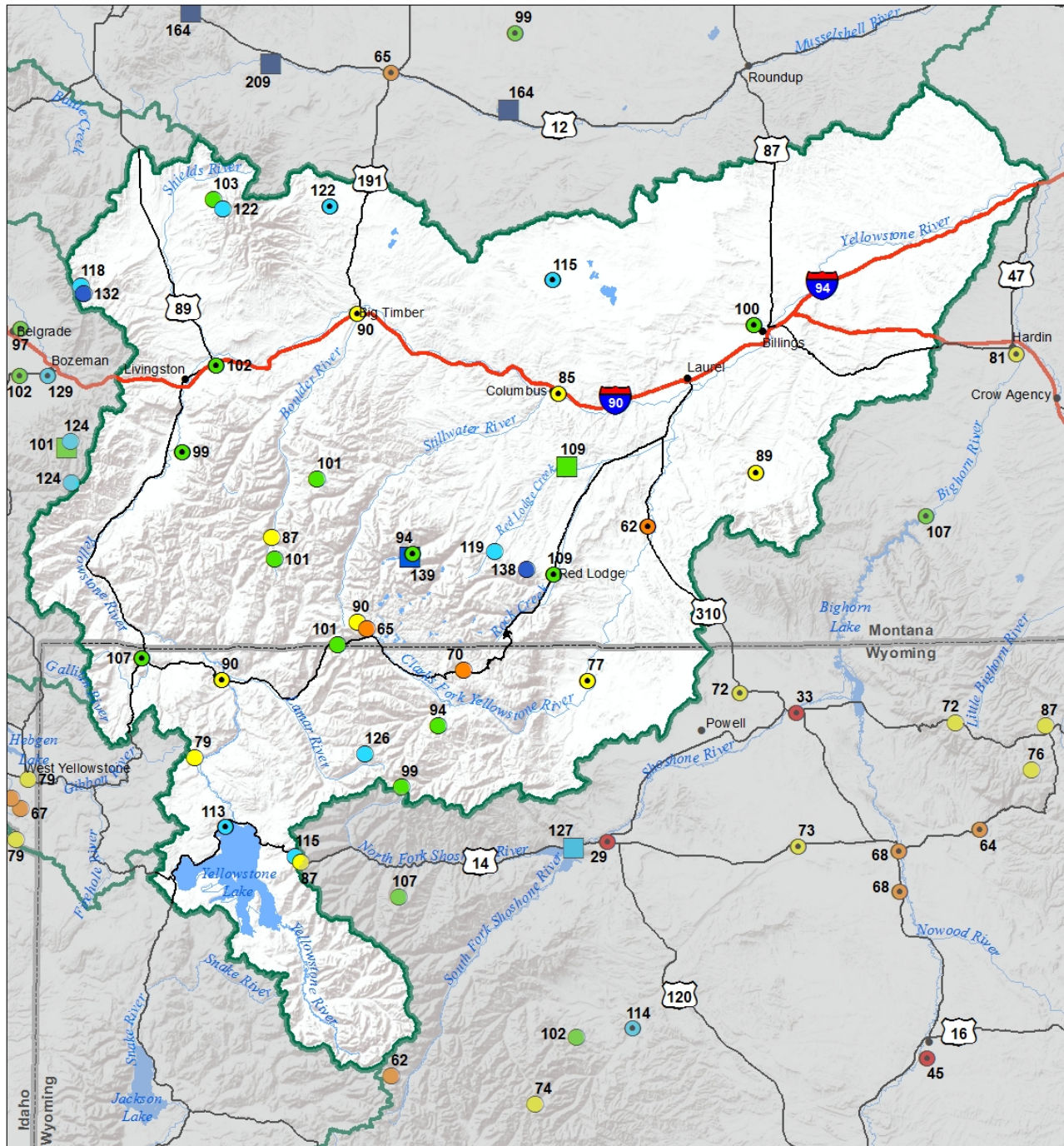
- > 150%
- 131 - 150%
- 111 - 130%
- 91 - 110%
- 71 - 90%
- 51 - 70%
- 1 - 50%
- 0%

Snowcourse

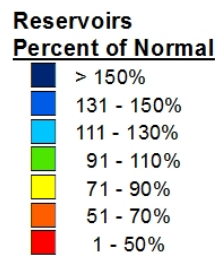
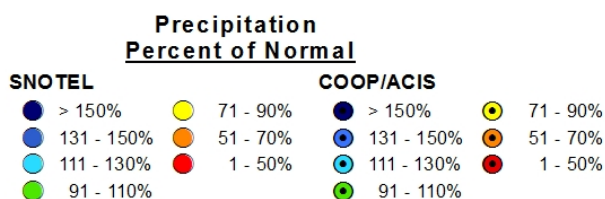
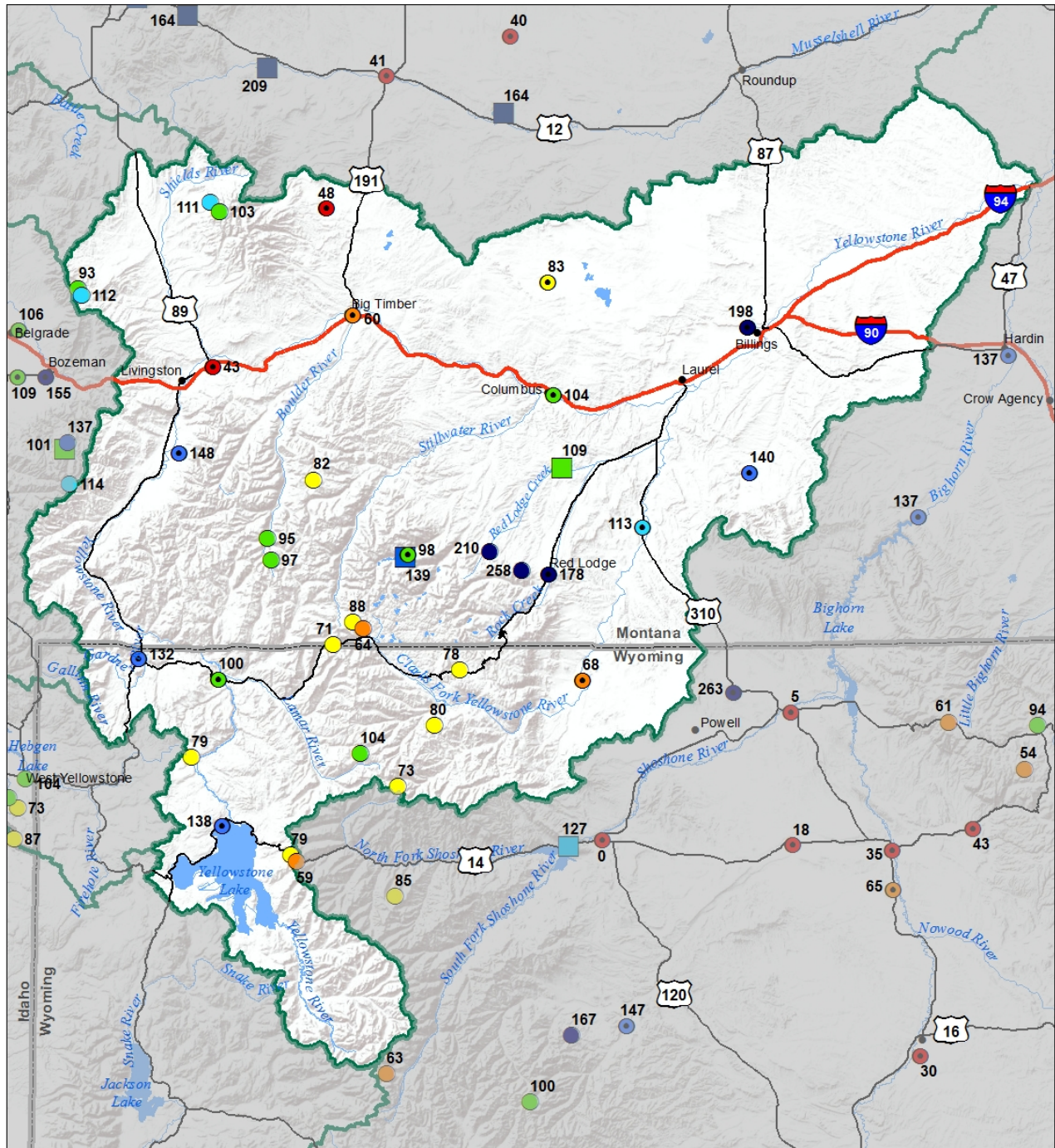
- ✚ > 150%
- ✚ 131 - 150%
- ✚ 111 - 130%
- ✚ 91 - 110%
- ✚ 71 - 90%
- ✚ 51 - 70%
- ✚ 1 - 50%
- ✚ 0%

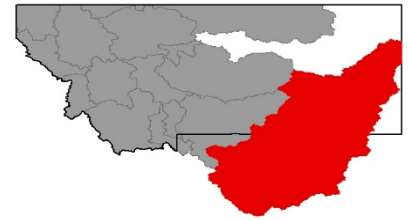


**Upper Yellowstone River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019**



Upper Yellowstone River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019 (January 1, 2019 - February 1, 2019)





Lower Yellowstone River Basin

Snowpack percentages vary widely across the greater Lower Yellowstone basin, with some regions below normal on February 1st, while others have near normal snowpack for this date. The western basins (Shoshone and Wind River) received below snowfall normal for January in some areas. Further east in the Big Horn Range snowfall was near to above normal for January. Snow totals for February 1st declined in the Shoshone River basin but did improve from Feb 1st in the Wind River basin. The rivers flowing from the Bighorn range (Powder, Tongue) have remained fairly static since last month and are near normal for this time. As we approach the spring months when the bulk of the snowfall typically occurs the snowpack is in good shape. Things can always take a turn with the uncertainty of El Nino's impacts, but most basins are on the right track.

Lower Yellowstone River Basin Data Summary

Snowpack	Percent of 1981-2010 Normal (Median)	Last Year Percentage of Normal (Median)
WIND RIVER BASIN	87%	118%
SHOSHONE RIVER BASIN	91%	140%
BIGHORN RIVER BASIN	97%	129%
LITTLE BIGHORN BASIN	97%	100%
TONGUE RIVER BASIN	91%	90%
POWDER RIVER BASIN	101%	114%
Basin-Wide Snowpack	93%	114%

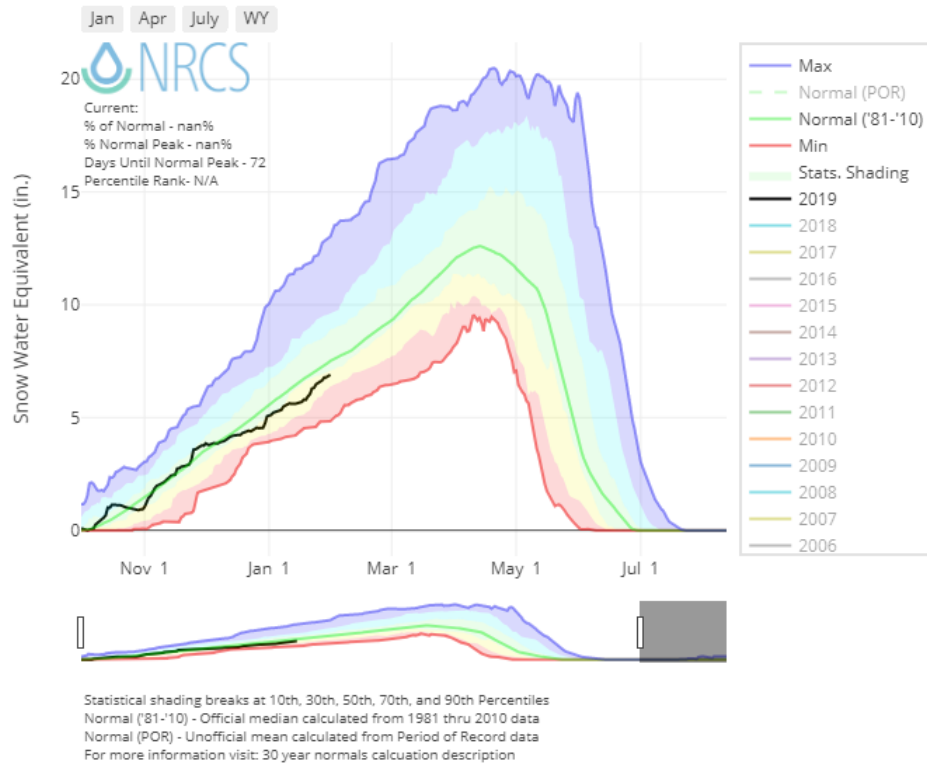
Precipitation	Monthly Percentage of Average	WYTD Percentage of 1981-2010 Average*	WYTD Last Year Percentage of Average
Mountain Precipitation	82%	88%	99%
Valley Precipitation	114%	107%	101%
Basin-Wide Precipitation	90%	93%	99%

*Water Year-to-Date (WYTD) Precipitation is October 1st - Current

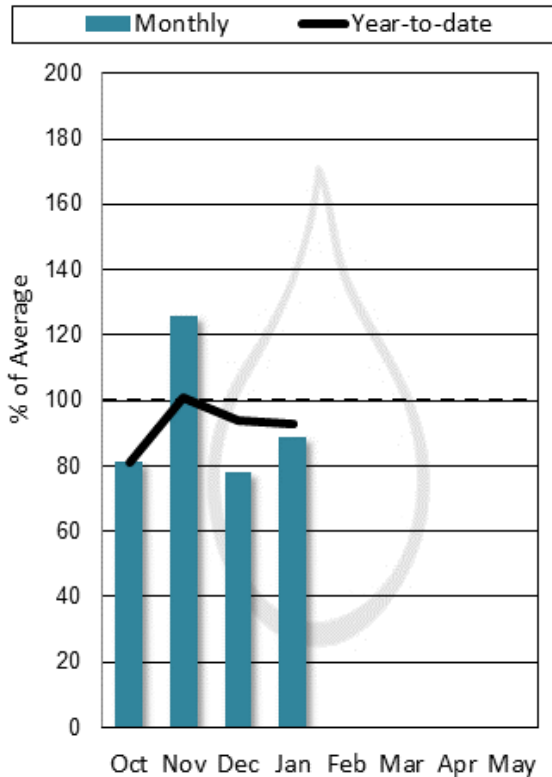
Reservoir Storage	Percentage of Average	Percentage of Capacity (Total)	Last Year Percentage of Average
Basin-Wide Storage	103%	61%	107%

(click on chart below to navigate to online version with additional features)

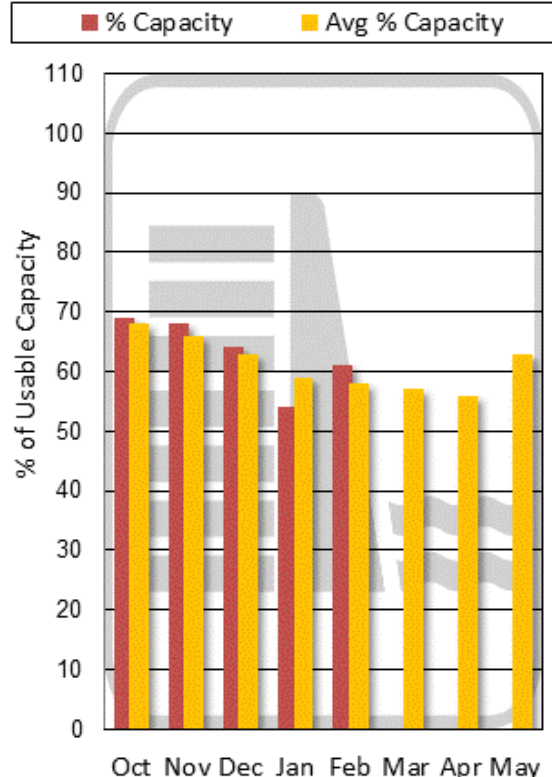
Snow Water Equivalent in LOWER YELLOWSTONE RIVER BASIN (Wyoming)



Mountain and Valley Precipitation

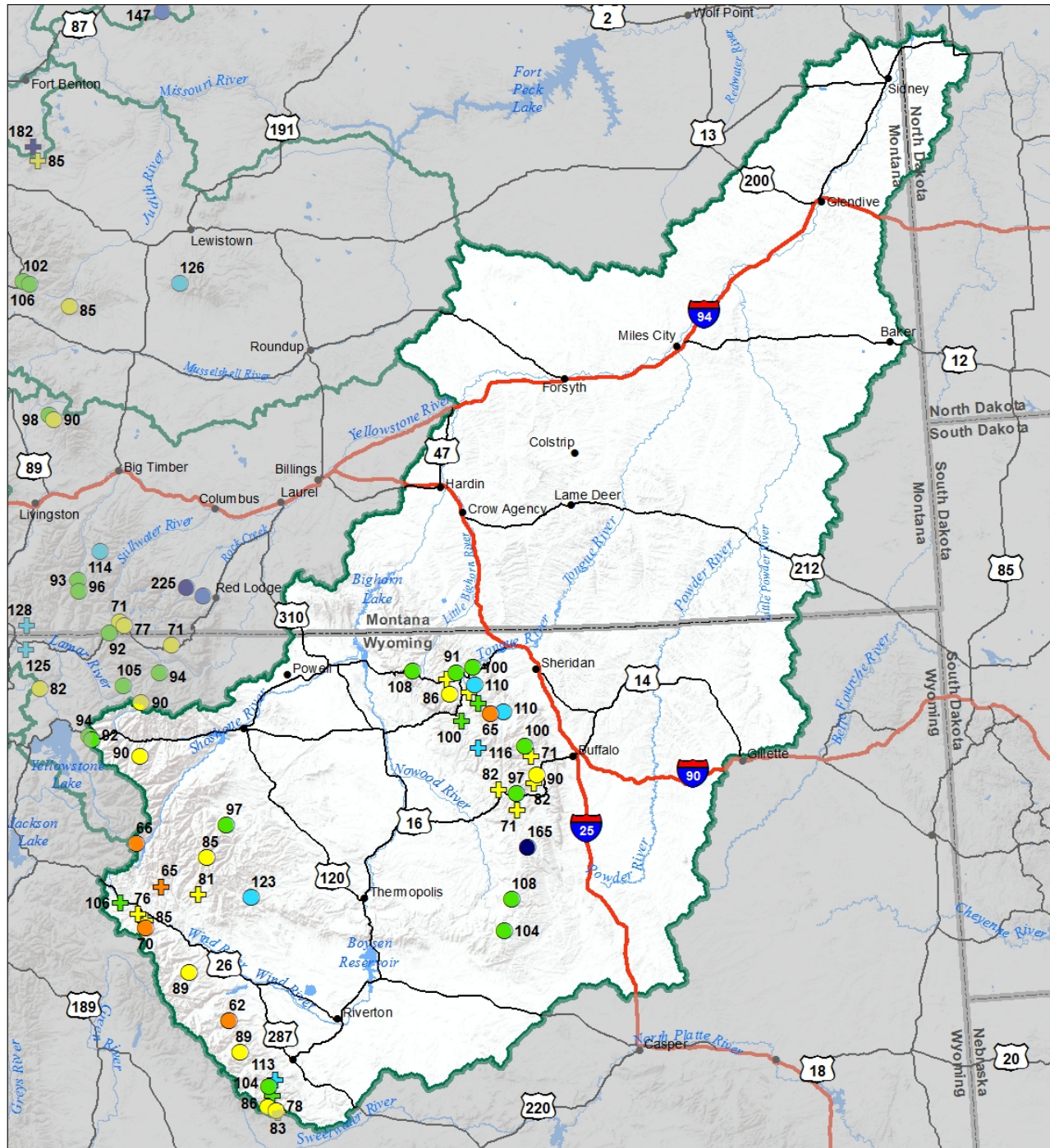


End of Month Reservoir Storage

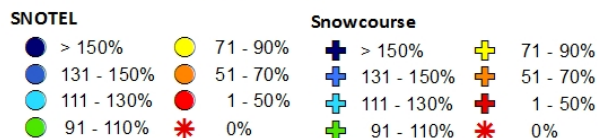


Storage above is averaged for all reservoirs in the basin. For individual reservoirs see table below.

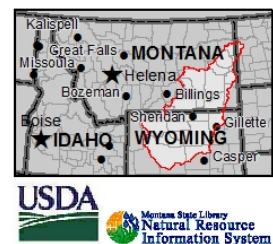
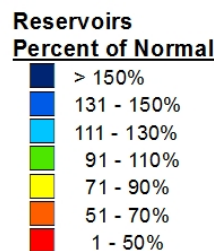
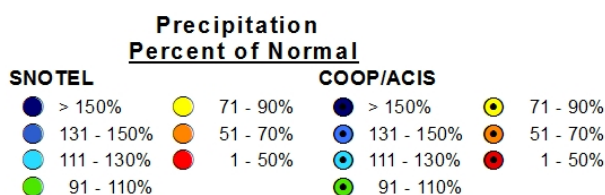
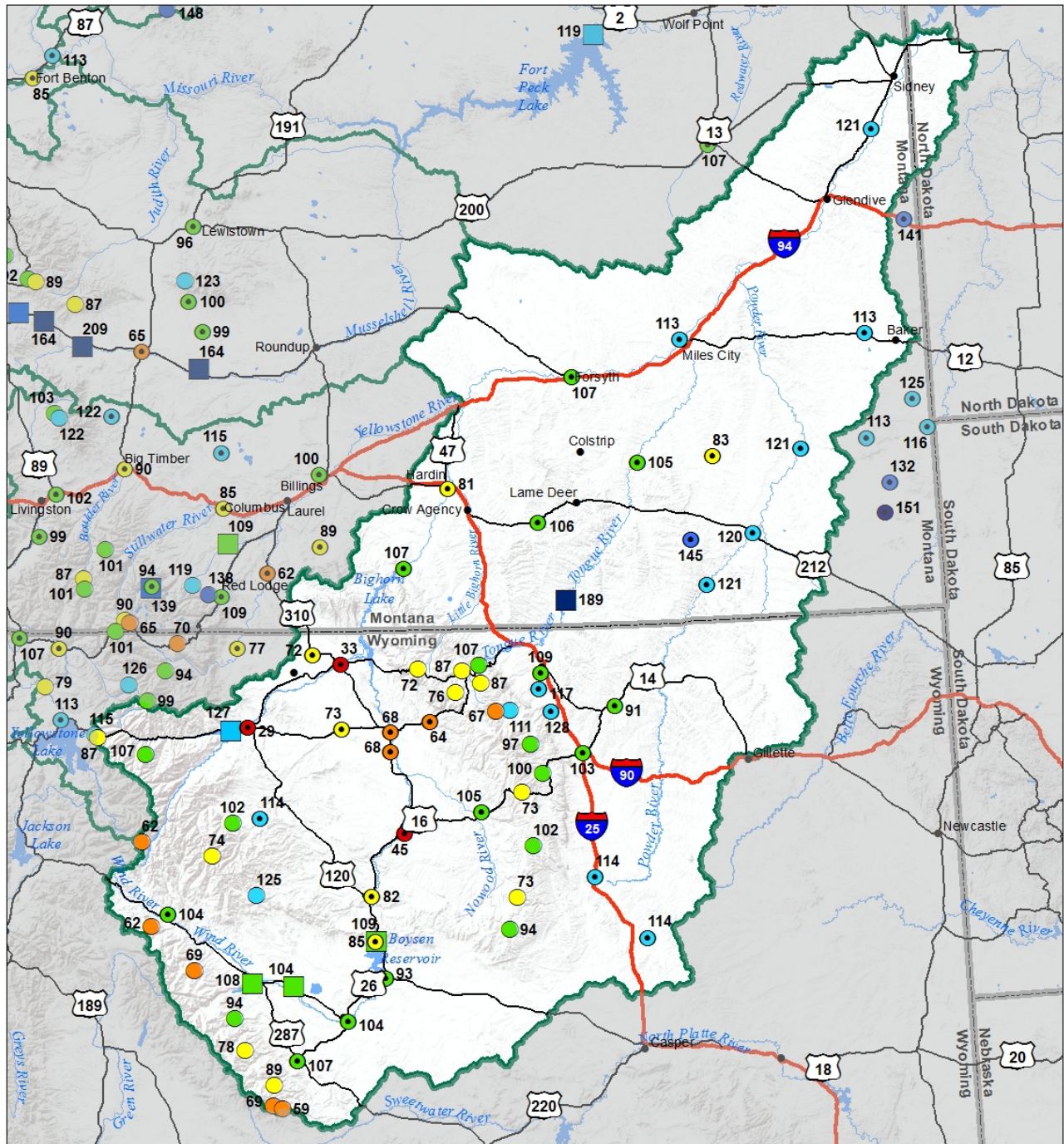
**Lower Yellowstone River Basin
Snow Water Equivalent
Percentage of Normal
February 1, 2019**



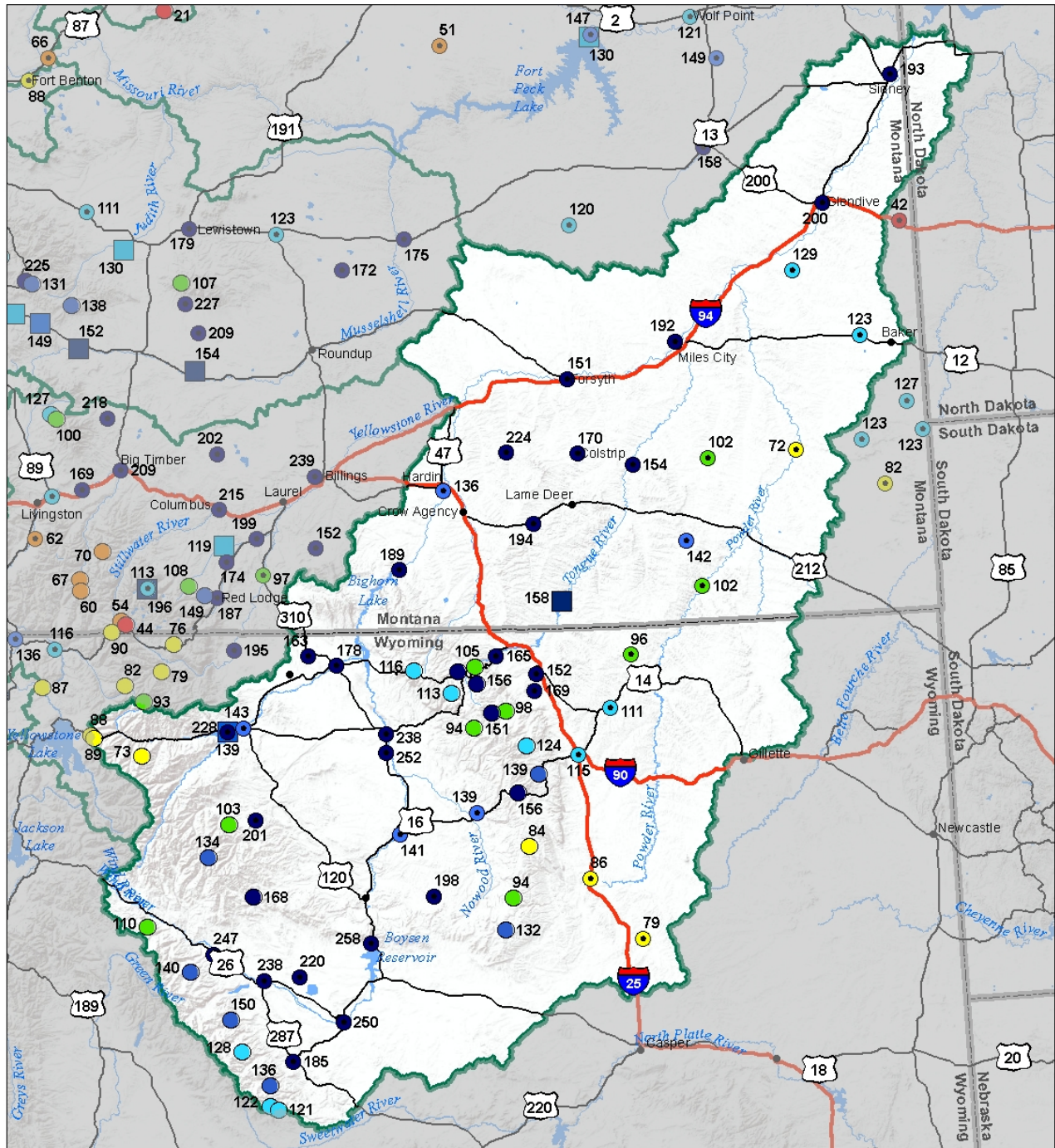
**Snow Water Equivalent
Percent of Normal**



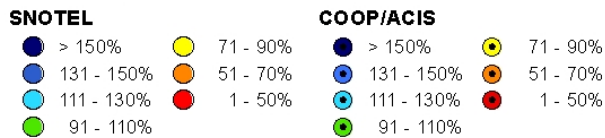
Lower Yellowstone River Basin
Water Year to Date Precipitation and Reservoir Levels
Percentage of Normal
February 1, 2019



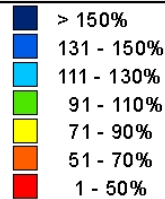
**Lower Yellowstone River Basin
Monthly Precipitation and Reservoir Levels
Percentage of Normal
June 1, 2018 (May 1, 2018 - June 1, 2018)**



**Precipitation
Percent of Normal**



**Reservoirs
Percent of Normal**



Issued by:

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Montana Water Supply Outlook Report

Natural Resources Conservation Service

